

# The Chemical Age

A Weekly Journal Devoted to Industrial and Engineering Chemistry

VOL. XII. No. 296

FEBRUARY 14, 1925

Prepaid Annual Subscription:  
United Kingdom, £1.1.0; Abroad, £1.5.0.

## Contents

	PAGE
EDITORIAL: A Life of Sir John Benn; Choice of a Sulphuric Acid Concentrator; Electrical Production of Carbon Black; The Chromising Process; "Durite"; The Patent Office Comptrollership .....	147
Chemical Engineering Conference in London .....	150
Progress in Industrial Standardisation .....	152
CORRESPONDENCE: Dehydrated Tar v. Bitumen (for Roads (E. S. Lennard); The Elimination of Noise B. P. H.); The Closure of Finsbury Technical College (A. G. Church); Institute of Petroleum Technologists .....	154
Society of Chemical Industry .....	155
French Chemical Industry Notes; Sir John Cass Institute ..	156
The Romance of Metallurgy; Chemistry and Agriculture....	157
From Week to Week .....	158
References to Current Literature .....	160
Patent Literature .....	161
Market Reports and Weekly Prices .....	164
Company News; Trade Inquiries; Chemical Trade Marks ..	169
Commercial Intelligence; New Companies Registered .....	170

**NOTICES:**—All communications relating to editorial matter should be addressed to the Editor, who will be pleased to consider articles or contributions dealing with modern chemical developments or suggestions bearing upon the advancement of the chemical industry in this country. Communications relating to advertisements or general matters should be addressed to the Manager.

The prepaid subscription to THE CHEMICAL AGE is 21s. per annum for the United Kingdom, and 26s. abroad. Cheques, Money Orders and Postal Orders should be made payable to Benn Brothers, Ltd.

Editorial and General Offices—8, Bouverie St., London, E.C.4  
Telegrams: "Allangas, Fleet, London." Telephone: City 9852 (6 lines).

## A Life of Sir John Benn

IN his fine memorial volume "John Benn and the Progressive Movement" (Ernest Benn, Ltd., pp. 522, 25s.), Mr. A. G. Gardiner has successfully told the story of a great man and a great movement. So subtly, however, are the personal and the public aspects intertwined and woven together in the fabric of the story that the author in telling the one always seems unconsciously to be telling the other. Yet, taking the work as a biography alone, the picture of the central character never suffers in colour or delineation from this dual treatment, for Sir John himself always stands out from the background of public events in terms which those who knew him personally will recall as life-like, and which will inform those who knew him by repute only of the manner of man he really was. On the personal side it is a charming record and character-study, in which the subject is shown truthfully and yet vividly, with the constant glow of colour and vivacity which made Sir John Benn so attractive a companion and so popular a public man. Here he appears, just as he really was, from his early days of struggle through the mature achievements of middle life to the ripe honours and rewards of a good old age. Artist, journalist, lecturer, humorist, politician, public servant and business man; one moment

blazing with indignation against public wrongs, the next unbending into the most engaging companionship; a figure who brought an air of vitality with him into all his associations, home or business, council chamber or St. Stephen's, the platform or the golf links, and made every cause and every company the more interesting for his presence—we see Sir John in this volume in all his quickly changing aspects and his great variety of interests, and the picture is one which will rest pleasantly in the memory. Apart from its qualities as a convincing literary portrait, the volume is a solid piece of municipal and political history, in which local self-government in London is seen to grow into a great reality, and many glimpses are given of contemporary figures in municipal and Parliamentary life. The book makes a dignified and worthy memorial.

## Choice of a Sulphuric Acid Concentrator

IT is not unusual to find new aspects of old problems in chemical engineering arising from time to time. The other day we were asked to indicate the governing considerations in the selection of a concentration plant for the production of sulphuric acid of 95-96 per cent. strength. It is not improbable that many acid manufacturers have, at various times, reached definite conclusions on this subject, but there are certainly a number of important considerations involved, and we cannot remember having seen these stated clearly hitherto. It is true that in the recent books on sulphuric acid concentration, published in the Chemical Engineering Library series, Parrish and Snelling give expression to the following view:—

"When large quantities of sulphuric acid have to be dealt with, the Gaillard type of plant is the most efficient and economical to work, practically in all respects except fuel consumption. Moreover, it is the best type of plant for dealing with dirty acids, in that the sludge can be dealt with automatically, without involving stoppage of the plant. With a good quality of chamber acid the Kessler concentrator has advantages in the matter of convenience and flexibility, and a higher strength acid can be produced with greater consistency. The Gilchrist concentrator in this country has not proved to be as efficient as the Gaillard; and, moreover, costs of operation are higher."

But this statement merely covers concentrators of the hot gas type, and does not relate to plant of the heated vessel category. In general, it will be agreed that for large quantities of concentrated acid, the Gaillard and Kessler plants are admirable in many respects. It is known, however, that there are many works in this country which need no larger plant than one capable of yielding 5 tons of concentrated acid per day. In many cases, these works receive demands for crystal-clear water-white acid. It is certain that this quality cannot be obtained in concentrators of the hot gas type. Cascade concentrators, with vessels of Vitreosil or the silicon irons,

are found to be somewhat more costly in operation, by reason of the increased fuel consumption and extra wear and tear, but there can be no two opinions concerning their eminent suitability for the production of crystal-clear acid. Some chemical engineers and acid manufacturers repose implicit faith in Vitreosil when they are called upon to meet fastidious demands in the matter of colour, but we have seen excellent concentrated acid, irreproachable as regards colour, produced with vessels made of one or other of the silicon irons.

There can be no doubt that the governing considerations determining the type of concentrator to be adopted are (a) the quantity of concentrated acid to be produced per day, and (b) the conditions to which such acid must conform. If the quantity required is large, and uniformity of strength rather than colour is demanded, then a hot gas concentrator is undoubtedly to be preferred, because it is economical in operation and working costs. On the other hand, if the quantity required is comparatively small, but an excellent colour is sought, then operation and working costs have to be sacrificed in order to secure that type of concentrator which will produce acid of the colour needed. For good-coloured acid, cascade concentrators undoubtedly "hold the field."

### Electrical Production of Carbon Black

CARBON black, or lampblack as it is more commonly known in this country, is a far more important industrial material than might generally be supposed. It is used extensively in a host of everyday processes, the more noteworthy of which are the production of printers' inks, gramophone records, rubber goods, linoleums, and certain artificial stones and tiles. The two terms, carbon black and lampblack, are not exactly synonymous, for the former strictly relates to that product as made in America by allowing the yellow flame of natural gas, burning with an insufficient supply of air, to impinge against a cool metal surface, whereas lampblack is the result of burning oils, resins, tars and such substances with an imperfect supply of air. The two final products, moreover, differ as regards their physical properties, the fine velvety carbon black readily admixing with water when agitated with it, whereas ordinary lampblack does not do this. It was pointed out some years ago that a high quality lampblack, superior, if anything, to the American product, might be obtained by sparking under pressure a mixture of hydrocarbon gases to which carbon monoxide or dioxide had been added, and that a modification of this method has been successfully developed by the U.S.A. Bureau of Mines is indicated by a memorandum just received from that department.

In the course of investigations of the effects of high voltage electrical discharges on hydrocarbons it was noted by the Bureau of Mines chemists that under certain conditions natural gas could be decomposed and carbon black produced. The effects of several types of electrical discharge on this gas and on certain liquid hydrocarbons and oils were, therefore, studied in order to ascertain the fundamental factors in the

reactions. As a result of this work it would seem that the method renders possible the recovery of a greater proportion of the carbon content of the gas than can be obtained with existing methods, while it is probable that, when oils are decomposed by the same process, the unsaturated gases produced may constitute profitable by-products if utilised for the manufacture of alcohols. It is suggested, too, that the permanent gases formed in connection with the process might be utilised for domestic fuel, thus reducing the net cost of producing carbon black. The chief recommendation of a process of this kind for producing carbon black from oils is—providing cheap electrical energy is available—that the material could be made just where it is needed, thus effecting a considerable saving in transport and handling charges.

### The Chromising Process

A CORRESPONDENT who is anxious to obtain information in connection with the more recent methods which have been introduced for the prevention of corrosion has asked us to give him a brief outline of the principle and applications of the process known as chromising. There is a good deal of general interest attached to this process, which is somewhat similar to that of calorising, in that it depends upon the property of some metals of diffusion at temperatures below their melting points. In chromising iron, the parts to be treated are packed into boxes with a pulverised mixture of chromium and alumina, usually in the proportion of 55 chromium to 45 alumina by weight. After packing the iron is heated to about 1400° C., either in vacuo, in hydrogen, or some neutral atmosphere for a length of time depending upon the depth of penetration desired and the concentration of chromium. The furnaces are usually alundum tubes wound with molybdenum heating wire and placed in a casing insulated with alumina powder. For satisfactory chromising it is necessary to use an iron of low carbon content otherwise penetration of the chromium is almost valueless. Chromised iron, though it can hardly be said to have reached a stage of wide commercial application, possesses several marked qualities which fit it for service in special machinery where resistance to corrosion is essential. It is found that the high temperature at which the process of chromising takes place lowers the resistance of the iron to high tension and fatigue stresses, though these properties may almost wholly be restored by suitable heat treatment.

The chief property of chromised iron is its resistance to corrosion, in which it shows equally good results with sherardised iron. If the chromised iron is carbonised the resistance to corrosion is considerably lowered, and case-hardened chromised iron, when exposed to the weather, very soon shows signs of deterioration. So far, chromised iron has been used for turbine buckets, with good results. In one case a nickel steel was chromised and then used for turbine buckets both for land and sea service. Chromised and ordinary nickel steel buckets are now being operated side by side in the same wheel of a turbine, and after a year's service it has been found that while the ordinary nickel steel bucket was badly corroded,

the edge being entirely obliterated and the surface badly pitted, the chromised buckets were in perfect condition and showed no signs of corrosion. Further experiments are at present being conducted as to the practicability of chromised iron and steel for use in machinery exposed to heavy corroding influences. In the meantime it is hoped by suitable after-treatment to render chromised steels as efficient as the ordinary varieties in physical endurance.

### "Durite"

ARISING out of the recent discussion on the relative merits of dehydrated tar and bitumen for road treatment, we publish a letter from Forbes, Abbott and Lennard, Ltd., respecting their material "Durite." In reply to inquiries, it may be well to state that "Durite" resembles refined tar in appearance and contains not more than 5 per cent. of water. The aggregate to be treated need not be dried or warmed, but economy is effected if the matrix itself is heated to about 150° F. before being added to the cold stone. Its covering power is said to be very considerable, one ton of 2 in. granite having been satisfactorily coated with 3½ gallons of warm matrix. For pot-hole repairs in wet weather, the matrix can be poured into and brushed round the hole, and then covered with damp granite chippings. Pot-hole repairs are being effected at present in this manner on certain Kent roads, and reports describe the result as quite successful.

In the spray form "Durite" is said to have one great advantage when applied to road surfaces—it does not cling to the tyres of vehicles and does not pick up in the way ordinary tar is liable to do. The spray can be applied either hot or cold by means of spraying machines, squeegees, brushes, etc., and traffic may be resumed at once over the sprayed area after application of grit without fear of the usual trouble with tarred chippings. These are some of the merits claimed for "Durite," but those who are interested further may obtain all the available information from the makers.

### The Patent Office Comptrollership

Most chemists, we imagine, will agree with *Nature's* plea that when, under the superannuation rule, the Comptrollership of the British Patent Office next becomes vacant, no candidate should even be considered who does not combine with experience of patent practice a thorough training in physical science. "It should," it urges, "be an absolutely inviolable principle that an essentially scientific staff should have a man of science at its head." The reasons for this seem fairly clear when the duties of the Comptroller are taken into account. He is, to begin with, the senior Hearing Officer for disputes as to patents, trade marks, and designs; a kind of court of first instance for certain classes of patent legislation. Secondly, he is in command of the staff of the Patent Office, in addition to those of the Trade Marks and Designs branches. Thirdly, the Comptroller would naturally be called upon to advise the Government of the day

on any proposals for the reform or extension of the patent system, and sound advice is most likely to come from one possessing ample first-hand knowledge of the working of the present system. The claim that a highly scientific department should be controlled by a man of science is reasonable, and if the scientific bodies interested in such matters make their views known they may be able to influence official opinion in the desired direction.

### Points from Our News Pages

A detailed report is given of the Chemical Engineering Conference on steam generation and internal combustion problems (p. 150).

Mr. C. le Maistre's address delivered in Prague at the invitation of the Czechoslovakian Engineering Standards Committee is reported (p. 152).

Interesting letters are published on the subject of "Dehydrated Tar v. Bitumen for Roads"; "The Elimination of Noise"; and "The Closure of Finsbury Technical College" (p. 154).

The first of a series of eight public lectures on "Chemistry in its Relation to Agriculture," by Mr. E. Holmes, is reported (p. 157).

The death is announced of Professor Hermann Schunck, Dr. H. B. Brown, Mr. F. Russig, Mr. T. H. W. Idris (p. 158).

Our London Chemical Market report shows fair activity with possibly a strong demand for benzol the outstanding feature (p. 164).

There is little to report in the Scottish market, inquiry is moderate (p. 167).

### Books Received

- PHYSICO-CHEMICAL EVOLUTION. By Charles E. L. Guye. London: Methuen and Co., Ltd. Pp. 171. 6s.  
LES NOTIONS FONDAMENTALES D'ELEMENT CHIMIQUE ET D'ATOME. By Georges Urbain. Paris: Gauthier-Villars et Cie. Pp. 172. 10 fr.  
THE PLATINUM METALS. By E. A. Smith. London: Sir Isaac Pitman and Sons, Ltd. Pp. 124. 3s.

### The Calendar

Feb. 16	Royal Society of Arts. Cantor Lecture (I): "The Inner Structure of Alloys." Dr. Walter Rosenhain. 8 p.m.	John Street, Adelphi, London.
17	Northern Polytechnic Chemical Association: "Old Methods of Measuring Time." R. S. Clay.	London.
17	Hull Chemical and Engineering Society: "The Romance of the Vegetable Oils." R. A. Bellwood. 7 p.m.	Grey Street, Park Street, Hull.
18	Society of Glass Technology	Sheffield.
18	Society of Chemical Industry (Newcastle Section): "A Redetermination of the Atomic Weight of Boron." H. V. A. Briscoe and P. L. Robinson. 7.30 p.m.	Chemical Lecture Theatre, Armstrong College.
19	Chemical Society	Burlington House, Piccadilly.
20	University of Manchester: "The Romance of Metallurgy"—Lecture III. "The Metallurgical Detective." Professor F. C. Thompson. 7 p.m.	Lecture Room, Chemistry Dept.
20	West Cumberland Society of Chemists and Engineers: "Corrosion; its Causes and Prevention." R. Douglas. 7 p.m.	Workington.
20	Oil and Colour Chemists' Association: Annual Dinner. 7.30 p.m.	Holborn Restaurant, London.



## Chemical Engineering Conference in London

### Steam Generation and Internal Combustion Problems

A JOINT meeting of the Institution of Chemical Engineers and the Chemical Engineering Group was held at the Institution of Mechanical Engineers, London, on Wednesday, when papers were presented by Mr. Oscar Brunler on "The Internal Combustion Boiler" and Mr. David Brownlie on "Steam Generation Under Critical Conditions."

#### The International Combustion Boiler

MR. OSCAR BRUNLER in his paper said that it was nearly thirty years since the first experiments were made by his father to solve the problem of burning an open flame in liquids. Thirty years ago there was no compressor which worked continuously without breaking down, or which could supply the same quantity of air for a certain length of time. Difficulties of many kinds arose; boiler after boiler was built, experiment after experiment was made, but the difficulty of maintaining a flame burning continuously in water seemed insurmountable. However, fourteen years ago, after persistent effort the first boiler was made which would work continuously. It was not a commercial proposition, and two more years passed before the boiler had reached that stage where it could be guaranteed that it would work for months without breaking down for repairs. After all these difficulties had been overcome there arose another obstacle. The papers on the continent of Europe had ridiculed this idea of an internal-combustion boiler, and professors of German Universities had published articles contending that the idea of burning a flame in water was almost impossible. He was very glad to say that the first order was obtained from a British firm, and that until the outbreak of the war British engineers took greater interest in the boiler than others. When the war broke out over 20 boilers had been ordered for various industries, but unfortunately these orders were not executed on account of the factory in Belgium being destroyed at the beginning of the war. His father then died, and he had to take up the work. On account of the absence of drawings or models he had to carry out experimental work and in 1922 he succeeded in building a boiler which worked continuously for months.

#### Steam Engine or Oil Engine

The great rivalry between the steam engine and the Diesel engine is due to the fact that the Diesel engine converts a greater portion of the heat of the fuel into energy than does the steam engine. This fact has been known since the first internal combustion engines were built, but it was of no great importance at that time and for many years after. The reason was that the combustion engines needed fuel which was more expensive than coal, and in some countries such fuel could be obtained only with great difficulty. Besides, internal-combustion engines were not as efficient as they are to-day. During the last twenty-five years, however, all these difficulties have been overcome, and combustion engines have been so designed that they are working efficiently with fuels of an inferior kind. The steam engine, on account of the improvements effected in it during the last 100 years, is usually considered the supreme factor in this struggle. If confidence is justified, which is doubtful, then it is clear that the oil engine in its present condition cannot supplant its rival, the steam engine, though this is doubtful in a world where nothing else is certain but change. Although in many respects the steam engine is superior to the internal-combustion engine, it is possible that further improvements in the latter may bring about complete supremacy.

The designer of steam engines who considers these facts with a view to the future must put the question, what is to be done in order to prevent the supremacy of the oil engine? The answer is easily given—convert more heat into energy! But how can this be accomplished? Further improvement of the steam-engine itself is very improbable. It also seems impossible to improve the boiler. All designs of boilers are based on the principle of bringing the flame of the fuel in the closest possible contact with the water in the boiler. If this is one of the main ideas why not burn the flame inside the water? Is it possible to burn a flame in immediate contact with a liquid? It is, as every kind of liquid fuel burns in the liquid as long as the quantity of air or oxygen is large enough to ensure complete combustion. This idea is fully demonstrated in the

working of the internal-combustion boiler, the principle of which is to maintain a flame burning in the liquid in order to evaporate the latter. During the years of experimenting, liquid hydrocarbons of a specific gravity between .8 and 1.2 have been used. Tar-oil from Belgium, coal-tar from Germany, Astatki from Baku, waste oil from America, and different kinds of oil from every part of the world have been tried. More than 60 different kinds of oil have been tried, and all these could be burnt without difficulty.

#### The System Described

The fuel crude oil, etc., and the air which is necessary for the combustion are supplied to the burner under a pressure which barely exceeds the pressure of the steam. Before starting, the connection valve is closed, and the water level in the generator must not be above the lower mouth of the burner. The cover of the ignition lamp is removed after heating the fire-clay lining of the ignition lamp, the oil and air ignite on the fire-clay lining. Then the cover is pulled down again, and the flame of the ignition lamp makes its way to the burner. After a few minutes the main burner is hot enough, and the main regulating valve is opened and the flame burns in the generator. Now the connecting valve to the water reservoir is opened and the water in the generator rises up to the middle of the burner. The flame which is burning quietly in the water can be observed through the peep-holes in the generator. By means of the superheater the steam can be superheated to any required degree. The superheater consists of a small burner similar to the ignition lamp, and its flame burns in the steam reservoir. The size of the flame and consequently the quantity of steam is regulated by means of the regulating valve, at the same time the ratio of oil and air are kept constant. By turning one wheel, the size of the flame can be regulated, and the ratio of fuel and air are not changed. Therefore it is not possible that the combustion can be altered through mistakes of the stoker. The temperature in the centre of the flame is approximately 1,800° C. This temperature diminishes to the periphery of the flame, so that between the centre of the flame and the periphery a rapid fall of temperature takes place. Since a permanent stream of burning gas has to pass this fall of temperature, it is evident that also the last traces of carbon-monoxide must be converted into carbonic acid. In leading the combustion in such a way the possibility is ensured of burning the fuel more completely than in the open air. The combustion under pressure brings the molecules of the fuel into better contact with the oxygen, therefore under pressure and in water the most complete combustion can be obtained.

Now let us consider how the flame acts and what takes place in the steam generator. At first the flame will give up the greatest part of its heat to the water due to the radiation and because of its contact with the water. Around the flame the superheated steam will be produced which will make its way with the nitrogen and carbonic acid, to the level of the water and pass over to the steam reservoir. The heating surface is the surface of the flame and the surfaces of the gas molecules which are passing through the water. It is evident that already after a few minutes the required steam pressure can be obtained. According to Dalton's law, in this boiler, in which steam and gas are present, the pressure of the mixture must equal the sum of the pressures of the gas and steam. The mixture of gases which pass from the steam generator to the steam reservoir contains 60 per cent. of steam and 40 per cent. of gases. These are the same gases which are working in the gas and oil engines, the only difference being that in these engines the amount of steam is much less.

During the tests which have been carried out with the submerged flame evaporations have been obtained which surpassed the theoretical ones. Samples of the oil which was used during the tests were chemically analysed and burnt in the calorimeter and the exact calorific value of the oil was determined, but for weeks and weeks a higher calorific value and consequently a higher efficiency than 100 per cent. was obtained.

#### Applications in Chemical Industry

After having considered the use of the boiler for power production let us for a moment see how this boiler can be used in the chemical industry. Steam for concentrating liquids or



chemical solutions is nowadays commonly applied because at the present time the majority of liquors are concentrated by means of evaporators. In this case a certain percentage of the required steam is produced in a separate boiler, and the heat for evaporation is obtained from condensing steam. The latter is allowed to condense on the surface of a tubular system, and evaporation proceeds at the other surface at a lower temperature. In order to increase the efficiency multiple effect evaporators are used. In this case steam is supplied to the first effect of the series wherein it is condensed either inside or outside the tubular system. The heat given up by the condensing steam evaporates some of the water from the boiling liquid, and the steam thus produced is then led to the second effect of the series. In the second effect the same process goes on as in the first, but at a lower temperature. In this way the liquid solutions are concentrated to the required density.

The efficiency of a good evaporator plant does not exceed 75 per cent., and I dare say the efficiency of the boiler which is necessary for producing the steam hardly ever surpasses in a factory an efficiency of 75 per cent. Considering the total loss of heat in the plant we lose at the very least 45 per cent. of the total heat supplied, or, in other words, if we have to spend £1 sterling for fuel we lose at the very least nine shillings, tax due to the inefficiency of the plant. In the internal-combustion boiler, the flame may burn directly in contact with the chemical solution, thus heating and concentrating the solution to the required density.

More than twenty different chemical solutions have been concentrated with the submerged flame, and no difficulties arose in concentrating those solutions. Besides using the internal-combustion boiler for power plants and for concentrating liquors it can be used for drying peat; in which case the flame burns directly in contact with the peat, and instead of oil the gas produced from the peat in a generator would be used as fuel.

### Steam Generation under Critical Conditions

MR. BROWNLIE stated that in the present contribution, which had been prepared at very short notice because of the absence of Mr. Benson himself, he would endeavour to give the essential principles of the new "Benson" process of steam generation under the critical conditions, and its utilisation at very high pressures and temperatures of superheat. The invention was essentially an improved method of generating steam at enormously high pressure in a narrow bore coil in such a manner that the troubles generally caused by ebullition were entirely avoided, whilst the process was patented throughout the world in 1922 and the first installation erected and operated at Rugby (England) early in 1924.

The apparatus in this latter case—and the patents allow of numerous modifications—consisted essentially of a very long coil of small bore ( $\frac{3}{4}$  in. diameter) steel tubing arranged vertically between an inner and outer casing of refractory material. Distilled water was passed in continuously at the bottom, using a gear-driven force pump operating at 3,200 lb. pressure per square inch, and the coil was heated externally by means of an oil blast flame entering at top and passing downwards. The water travelled upwards through the coil and was gradually heated until finally, within about 10 per cent. of the discharge end, it reached 706° Fahr. (375° C.), the volume being then about three times that of water at 60° Fahr. The pressure was, of course, all the time at 3,200 lb. because of the pump, and the whole mass of the water was then quietly converted into steam at the same volume without ebullition and the absorption of any latent heat.

The steam was then discharged to a special reducing valve and the pressure lowered, followed by a passage through a superheater consisting of an exactly similar but shorter coil of  $\frac{3}{4}$  in. steel tubing above the generator, so that the final pressure of the steam was 1,500 lb. per square inch and the temperature approximately 790° Fahr. (420° C.), that is, about 195° Fahr. (90° C.) of superheat at 1,500 lb. pressure.

The design of the complete plant also included the use of a high-pressure steam turbine running at 25,000 revolutions per minute, exhausting at 200 lb. per square inch, with the development of 350 kw. by the drop in pressure to an ordinary pressure condensing turbine, giving another 900 kw., that is

a total of 1,250 kw., but this steam utilisation portion of the equipment was not completed.

The main object in the design of the condensing steam engine or turbine is to work at the highest possible steam pressure, and the long history of steam power is made up chiefly of the struggle to increase this pressure. The reason is rendered obvious on studying Steam Tables, since the bulk of the heat energy put into the water is taken up by raising the temperature of the water (sensible heat) and by the latent heat of steam, leaving only the sensible heat in the steam available for useful work in pushing the piston of the engine or the blade wheels of the turbine. Thus, from Steam Table figures at about 16 lb. gauge pressure the total heat is 1,166.3 B.Th.U., and at the temperature of the steam, 252.0° Fahr., the total heat energy available for work is only 61.2 B.Th.U. But at about 200 lb. gauge pressure the total heat is 1,199.0 B.Th.U. and 94.2 units are available for work. That is to say, because of the increase in pressure, for 2.8 per cent. more heat added to the steam 54 per cent. more heat for useful work is available, a huge increase in efficiency from a practical point of view.

What has prevented the extended use of very high pressures has been constructional troubles, chiefly because of ebullition caused by latent heat absorption, the main difficulty being that of building a boiler, but also, to a lesser extent, steam pipes, and an engine or turbine that will stand the pressure.

The essential obstacle to high-pressure steam is latent heat, the sudden and violent conversion of a small volume of liquid (water) into a very large volume of gas (steam). Thus, even in the case of 200 lb. pressure water-tube boilers every engineer knows that one of the great troubles is priming and wet steam, due also, of course, to latent heat absorption and the fact that the steam is given off violently in the form of bubbles.

Benson, however, has now solved the problem by the simple and ingenious method of going right up to the critical conditions of pressure and temperature, and converting water into steam at the same volume, and therefore without the absorption of any latent heat, with no ebullition or "boiling" so that the coil generator is not a "boiler" at all. Benson was originally a chemist in the petroleum oil industry in the United States, and made a detailed investigation of the "cracking" of higher boiling point fractions by means of extremely high-pressure steam. From this he was led to undertake a special study of the Steam Tables, and as a result evolved a practical coil steam generator operating at the critical conditions and eliminating latent heat altogether.

#### Advantages Claimed

The advantages claimed for the "Benson" generator are simplicity, convenience, efficiency, small capital cost, light weight and reduced floor space in the production of steam at the highest pressures. The steam generation efficiency is certainly very high and may easily reach 95 per cent., because of the intensely localised flame used, with little excess air over the theoretical, almost negligible, radiation losses from the casing, and the low temperature of the final exit gases after passing the heater. Thus with both pulverised fuel and mechanical stoking on the latest principles 92.5 per cent. steam generation efficiency has been reached with ordinary large water-tube boilers, and it may be stated Benson used an oil flame at Rugby merely for convenience, since gas or pulverised fuel will do equally well.

As regards the auxiliary power, however, required for pumping the feed-water and operating the oil blast, the figure corresponds to approximately 6 per cent. of the steam generated the feed pump naturally taking much more power than in an ordinary boiler plant, where under the latest conditions the total auxiliary requirements do not exceed about 1-1½ per cent. of the evaporation. The danger of the high pressure can be regarded as negligible, because of the small water content, and is probably less than the ordinary boiler at several hundred pounds pressure. Thus the installation at Rugby was tested by the Insurance Company at 6,400 lb. pressure for twenty minutes, and a small bore tube will stand up to 10,000 lb., whilst the rate of insurance is no more than the average steam plant.

Obviously, also a great advantage is the exceedingly small weight, and the importance of this for marine, locomotive and motor vehicle work will be apparent. Thus, for example, in marine practice it is stated that under the best conditions with high-pressure "Scotch" boilers 750 lb. of water is

carried in the boiler per 100 shaft h.p., whereas with the "Benson" generator the figure would be 70 lb., and at the same time the saving in floor space is 30-60 per cent.

Also the capital cost of the complete installation would be considerably less than the present ordinary high-pressure steam plant. Whether the method will prove to be a practical proposition or is subject to disadvantages that can only be proved by long continued large scale running remains to be seen, and further information will be awaited with the greatest interest. Certainly a drastic reorganisation of our present methods of the utilisation of coal is long overdue, and we cannot go on for ever squandering millions of tons of fuel per annum. On present knowledge the most scientific principle would certainly appear to be first the treatment of all our raw coal by special methods of carbonisation, so as to produce the maximum yield of paraffinoid liquid products, the minimum amount of rich gas, and a free-burning smokeless fuel. This would then enable the application of electricity to be enormously extended in every direction, because of its efficiency, cleanliness, safety and ease of transmission, and full use to be made of the scientific and economical internal combustion or Diesel type of engine, because of the home oil supply made available. For the low-pressure process steam requirements, now consuming 20,000,000 tons of coal per annum, the ideal

would be generation at the highest possible pressure, passage through turbines with several stages of reheating, and the utilisation of the exhaust steam at, say, 10-40 lb. for process work, giving an overall thermal efficiency of 70-80 per cent., or even higher. For this work, and special cases like loco motives, motor vehicles and steamships, the importance of the generation of steam under the critical conditions does not require much emphasis.

Finally, this work at the critical conditions and the world patents awarded to Benson has drawn attention to the fact that many investigators have endeavoured to work at very high steam pressures. Thus we have an early English pioneer, Jacob Perkins, and the work of Dr. Jaroslav Havlicek, who suggests a 3,000 lb. pressure turbine, whilst it is understood also that Jacques F. Overwyn in the United States has been experimenting for a number of years at abnormal pressures. Further, also, the high-pressure and superheat work of Schmidt in Germany is well known, as well as that of Blomquist in Sweden, already mentioned. The subject is an intricate one, but certainly to Benson seems to belong the credit of realising for the first time the true meaning and importance of the generation of steam under actual critical conditions so as to eliminate ebullition altogether, and, above all, to have carried it out on a large scale.

## Progress in Industrial Standardisation

By C. le Maistre

*We give below the substance of an address by Mr. C. le Maistre, Secretary of the British Engineering Standards Association, delivered in Prague and Brno at the invitation of the Czecho-slovakian Engineering Standards Committee.*

I AM not competent to come amongst you and give advice as to what directions you should apply national simplification, yet from my long experience, now over 23 years, I am convinced that great economies can be effected in the use of both materials and apparatus of all kinds through judicious simplification and standardisation carried out on a national basis. The majority of people probably are already converted to the idea of industrial standardisation. Objections are usually to the effect that standardisation interferes with invention and design and especially with individuality, that it tends to produce crystallisation and eventually to stultify general progress. Such objections are very real ones, and can only be dealt with satisfactorily by proper safeguards very strictly applied. If an engineer, for instance, wishes to insist upon his individuality he can always be accommodated—at a price, but the ordinary average man prefers to use materials and apparatus produced in accordance with national specifications in order to secure the resulting saving in cost. On the other hand there are a certain number of fanatics who could standardise everything, but I think it is generally accepted that extremists in any walk of life have to be firmly suppressed.

### "Unification" better than "Standardisation"

The term "Standardisation" is an unfortunate one. It seems at once to give the idea of crystallisation, of the setting up of an unalterable standard, and I do not think too much stress can be laid on the fact that industrial standardisation is nothing of the sort. Indeed, in the work of the British organisation there are very few actual standards throughout the specifications already issued, which now number well over 200 exclusive of those for aircraft purposes issued for our Air Ministry. Fundamental standards of mass, length and time, as well as standards for electrical measurements, in most countries are dealt with by the National Physical Laboratories, whereas the national specifications prepared by our organisation are rather in the nature of a handy tool to be used with contracts for the purchase of materials and apparatus on the most economical lines.

The British Standard Specifications are arrived at by unifying the needs of industry and recommending what is best in present practice and what can be adopted by industry with the least possible disturbance. In its broadest sense it means national simplification, the reduction of the number of types and patterns used for one and the same article.

The main object of industrial standardisation or unification is the saving of waste through the simplification of manufacture tending towards national economy. In Great Britain there has been no attempt to force standardisation nor to set up an

ideal straight away, as it was felt in most cases that that would be too costly for industry to adopt. On the other hand, one has to acknowledge that many industries are still bound by tradition and drift along with an enormous diversity of spare parts, making no attempt to simplify or standardise. This means a vast amount of stock, a slow turnover and high cost of production.

### Benefits Consumer and Producer Alike

The setting up of national specifications for quality and performance, whereby proper comparisons can be made, and the unification of tests and dimensions of components parts where interchangeability is necessary, are some of the advantages to be gained. Rapid and economical production may be claimed as one of the leading benefits, for it not only assists the manufacturer but also the consumer in the rapidity with which his orders can be fulfilled from stock. There is also the ready and quick replacement of damaged and worn parts and not infrequently a reduction in the selling price.

Whilst the attempt to standardise whole machines is to be deprecated, the standardisation of component parts with a view of obtaining interchangeability is of immense value not only to the purchaser in quick delivery but also to the manufacturer in enabling him to manufacture to stock during slack times, knowing that his product can be more economically produced in this way through the reduction in his overhead charges and that delivery to the purchaser will be able to be made without the loss of time which so often occurs at present. It also enables him to give more work to his people. Mr. Ford in America has written a most remarkable book in which he gives the principles underlying his business, which are "service to the community," giving satisfaction to the purchaser and more work to more people. National standardisation has practically the same objects and should produce the same results if carried out with proper safeguards to prevent crystallisation.

The proper safeguards are periodical review and revision of the national specifications. The adoption, therefore, of these uniform specifications goes a long way towards minimising the cost of tendering to the manufacturers and brings into commercial transactions greater confidence and simplicity as well as protection to both user and producer against unfair competition.

It would be a mistake to think, however, that this national work is confined solely to the setting up of these specifications; highly important as they are to the progress of industry. The fact of bringing people together to discuss the best methods of unifying and simplifying their requirements, in which they all

have a common interest, is of equal if not more importance, as it quickly establishes points of contact, enabling them to arrive at an understanding amongst themselves impossible in any other way. Industrial standardisation after all is very largely concerned with the human factor, and in dealing with this side of the problem the establishment of friendly relations is of paramount importance. For the manufacturer it is a business proposition from which an adequate return should be expected. From the people's point of view it is a process of simplification, a saving of time and material, a progressive step in the industrial sphere, lightening the general burden and tending to raise the human level. It is in fact service to the community.

#### Economic Basis

A very important point in this national simplification is that the specification should have an economical basis. If this is kept well in the forefront the result will be the production of national specifications which, though perhaps not entirely ideal, will represent the best which can be advantageously attained at the moment, it always being understood that improvements will come about through the process of time. National specifications drawn up in this manner are likely to be adopted rapidly by the community as a whole, for instead of being costly to introduce they will actually produce all-round economies.

Whilst every care must be exercised to prevent crystallisation or lagging behind industry, the national specifications should have a certain measure of permanency if they are to be received with confidence by industry, and the specifications should not be changed too often unless such changes are distinctly in the direction of improvements.

Such standardisation is very far from fossilisation or stultification; it invites improvements and progress. The specifications drawn up on this basis are arrived at through the elimination of the unnecessary and the recognition that the recommendations are not unalterable, but subject to review whenever industry itself feels it economically desirable or necessary to do so.

#### Proposals Emanate from Industry

Lastly it is our experience that to be of lasting benefit, the proposals for standardisation or simplification should emanate from industry itself. The manufacturers are in daily contact with the machinery or apparatus under consideration and are in the best position, by co-operation among themselves, to put forward constructive proposals for simplification which can be adopted by the committee. Criticism of these proposals can be supplied by the scientific and technical experts of the users. These are the principles upon which the British Standard Specifications are drawn up, and it is due, I think, to these principles having become so well established that these specifications are becoming so widely recognised and used throughout our country.

National standardisation is really a science all of its own, and it is only gradually that the underlying principles have evolved themselves and its great economic value become recognised.

#### One Central Organisation

After describing in detail the organisation of the British Standards Association, Mr. le Maistre proceeded:

The advantages of having the whole of this national movement under one roof are manifest, more especially when the interdependence of the different branches of industry is recognised. Our organisation from its experience has proved that it can carry out the work far more cheaply than it could be carried out with the same efficiency by any single branch of industry and it has a highly trained and experienced staff. It is true that individual companies carry out a great deal of simplification, and quite rightly so, and so do some branches of industries, but in most cases the investigations to which this gives rise soon go beyond the boundaries of that particular industry, and it is for this reason that the national organisation is of such utility in bringing standardisation to its high effectiveness. The British Engineering Standards Association, I would repeat, always waits for pressure from outside before undertaking any work and the pressure is increasing very greatly, so much so that it is a struggle with the funds and staff at our disposal to give satisfaction all round.

#### International Standardisation

You will have appreciated from what I have said some of the difficulties we have to contend with as well as some of the

success which has been achieved. I feel that this success is largely due to the fact that so much care is taken not to put forward any national specifications which have not received the full backing of industry prior to their issue. To do this means endless conference and consultation, but it pays in the long run. To go from that to international standardisation obviously means a great increase in difficulties. You have at once the difference in units, difference in language, as well as racial characteristics. However, whilst international co-operation is still immensely difficult, I would say that some progress at any rate is being made towards bringing the national standardising bodies together through the efforts of the Unofficial Conference of Secretaries. This is a permanent body authorised by the main committees of the different national standardising bodies. It has infrequent meetings, but the members are constantly in direct communication with each other through the Secretary of the Swiss Committee, who acts as a centre of correspondence. A good deal of useful simplification of methods and procedure has already been accomplished; periodical information in regard to the work in the respective countries is circulated and copies of the various national specifications are automatically distributed, so that each organisation has the standards of all the others. My organisation has decided on principle that each of their B.S. Specifications shall have metric equivalents placed alongside the British dimensions in order to meet, as far as possible, the requirements of engineers and purchasers in those countries where the metric system is the prevailing one.

In the electrical industry international standardisation has proceeded with less difficulty than in the older industries, and under the auspices of the International Electrotechnical Commission, formed in 1906, and with which the B.E.S.A. is closely connected, is doing very useful work. It has 27 countries taking part in its work, its object being not only to bring the electricians of the world together, but to attempt to set up internationally a fair method of comparison of tenders for electrical machinery. Whilst the difficulties are very great, due in large measure to difference in local conditions which cannot easily be overcome or reconciled, yet steady progress is being made towards this desired object. The International Electrotechnical Commission is a small League of Nations, and like its greater sister it is proving itself of very great utility.

#### America's Chemical Trade

THE following official figures furnished by the Department of Commerce provide interesting comparison of America's imports and exports of the principal chemicals during December 1923 and 1924. In the imports the outstanding features are the remarkable increase in the figures for copper sulphate and potassium chlorate.

	December 1923.	December 1924.
White arsenic, lb. ....	2,814,018	652,341
Citric acid, lb. ....	44,800	56,000
Formic acid, lb. ....	140,901	174,237
Oxalic acid, lb. ....	228,441	492,245
Tartaric acid, lb. ....	297,584	268,800
Copper sulphate, lb. ....	—	182,937
Carbonate potassium, lb. ....	917,979	759,237
Hydroxide potassium, lb. ....	1,866,209	1,148,577
Chlorate potassium, lb. ....	—	676,831
Cyanide sodium, lb. ....	2,850,714	2,287,524
Ferrocyanide sodium, lb. ....	98,218	173,139
Nitrite sodium, lb. ....	82,933	270,651
Naphthalene, lb. ....	1,927,614	315,241
Creosote oil, gal. ....	4,589,311	6,897,321

On the export side a noteworthy drop in the figures for benzol will be observed:

	December 1923.	December 1924.
Benzol, lb. ....	9,143,958	7,914
Sulphuric acid, lb. ....	359,665	948,326
Acetate of lime, lb. ....	1,347,667	980,145
Bleaching powder, lb. ....	1,455,386	1,690,223
Chlorate of potash, lb. ....	16,450	13,377
Bichromate of potash, lb. ....	220,899	70,257
Soda cyanide, lb. ....	16,256	189,269
Soda ash, lb. ....	1,186,255	1,626,516
Caustic soda, lb. ....	9,631,927	8,619,679
Sulphate of ammonia, tons ....	11,653	6,166



## The Elimination of Noise

To the Editor of THE CHEMICAL AGE.

SIR,—I have recently read with great interest *The Screening and Grinding of Materials*, published in your new Chemical Engineering Library.

With regard to the first chapter on "Inclined Screens," I think the author has missed a most vital point in not emphasizing the absolute necessity of excluding from a factory all screens of that well-known type that are tapped by mechanical hammers or bumped by cams. The reason for this exclusion should be obvious, as such contrivances make an appalling noise.

The following are a few excellent reasons why the screens as a portion of, say, a milling plant, should, in the interests of general efficiency, be designed to run as quietly as possible:—

1. So that the miller can hear the normal purr of his motors, belting, etc., and so quickly detect anything running wrongly.
2. That the engineer or foreman can give better supervision. He would often say nothing sooner than have to shout himself hoarse.
3. In the interests of the miller himself, and other men who have to be on the spot for eight hours.

There are still people who think efficiency and noise are inseparable, but we, in the chemical factories, cannot afford to sneer at colliery practice, until machines such as rock crushers, stamp batteries, etc., are re-designed.—Yours, etc.,

B. P. H.

## "Dehydrated Tar v. Bitumen for Roads"

To the Editor of THE CHEMICAL AGE.

SIR,—In addressing this letter to you on the subject of your article "Dehydrated Tar v. Bitumen for Roads" appearing in your journal for January 24, we, as manufacturers of a proprietary article sold under the name of "Durite," want to make it quite clear that we are not asking for a cheap advertisement; we do feel, however, that the whole subject is of such extreme importance to the public that we ought to inform them that something has now been found which is very much better, in our opinion and in that of many surveyors also, than either dehydrated tar or bitumen for both the surface-treating of roads and also for the coating of road metal.

If coal tar is treated in a certain way it can be applied to roads either wet or dry and to undried road metal. The material in make resembles tar in appearance and is applied just in the same way as ordinary road tar. Several tests have been carried out in London districts which in every case have given entire satisfaction. The fact that traffic can be allowed to pass over the treated surface immediately after application without the least danger of the material "picking up" will be good news for motorists who up to the present have been compelled to put up with the annoyance of having their cars spattered with tar-coated chippings during the tarring season. We shall be pleased to furnish full particulars to any of your subscribers who care to write to us.—Yours, etc.,

FORBES, ABBOTT AND LENNARD, LTD.

E. S. LENNARD, Director.

37-39, King William Street,  
London, E.C.4.  
February 2, 1925.

## The Closing of Finsbury Technical College

To the Editor of THE CHEMICAL AGE.

SIR,—The closing of Finsbury College, for lack of financial support from the City companies and the London County Council, has been determined upon to take place at the end of the year 1926, and there seems little hope that the London County Council will reconsider its decision.

It will be remembered that, as a result of strong protests three years ago, the London County Council decided to support the institution for a further period, but it seems now to be an established fact that Finsbury Technical College can no longer attract a sufficient number of students desiring to advance their technical knowledge but having no anxiety to obtain University degrees.

The passing of any institution of this kind raises inevitably the question of the future of the staffs engaged. While any institution threatened with closure remains open staffs must be maintained, and men who have served long and faithfully the cause of education should not, like their institutions, be

regarded as superfluous or redundant. Unfortunately, there is no indication in the attitude of the London County Council that as yet that body has considered the position of the staff, and has made any provision for their subsequent employment. Accordingly at the annual council meeting of the National Union of Scientific Workers, held on January 31, the following resolution was put and carried unanimously:—

"In view of the fact that the closure of the Finsbury Technical College is a certainty the London County Council is urged to make provision for the absorption in other institutions, with seniority, of those members of the staff who will be on the staff when the college closes."

Copies of this resolution are being forwarded to the chairman of the London County Council Education Committee.—I am, etc.,

A. G. CHURCH,

General Secretary.

National Union of Scientific Workers,  
25, Victoria Street, S.W.1.

## The Bergius Hydrogenation Process

### Favourable Results of Experiments

At a meeting of the Institution of Petroleum Technologists, held in London on February 3, a paper by Dr. H. I. Waterman and J. N. J. Perquin (of the Technical University of Delft, Holland) was presented on "The Decomposition of Paraffin Wax at 450° C. in the Presence and in the Absence of Hydrogen under High Pressure (a contribution to the knowledge of the Bergius process)."

It was explained that earlier investigations had shown the favourable influence of hydrogen under high pressure on the process of decomposition which occurs when paraffin wax is heated to 450° C. It was found that hydrogen under high pressure:—(a) enters into combination, and forms part of the products, during the reactions which are proceeding; (b) causes the production of less unsaturated distillates (gasoline and kerosene); (c) lowers the specific gravity of the residue obtained on distillation of the reaction-product. Notwithstanding the lack of experimental data and their imperfect knowledge of the reactions the authors had been successful in adding to knowledge of the Berginisation process. "We have reached this result by studying the influence of time on the decomposition at 450° C. of paraffin wax in the presence and in the absence of hydrogen under high pressure. The raw material which was used in these experiments was Rangoon paraffin, solidifying point (Shukoff) 58°, specific gravity 20°/4°: 0.913. Elementary analysis gave 84.6 per cent. C and 14.8 per cent. H. The charge for each experiment was 200 grams; this was heated at 450° C. in an autoclave. To promote mixing, three steel balls of a total weight of 79.5 grams were added."

### Conclusions

The experiments, which were described in detail, led to the following conclusions:—

Comparative experiments show that Berginisation has various advantages over heating in absence of hydrogen under high pressures (cracking). After some hours' Berginisation a larger percentage of gasoline and of kerosene is obtained, while less gas is produced. Coke has not been formed to any material extent. The liquid products of reaction are more saturated. The residue on distillation (boiling point exceeding 300° C.) after 4 hours' Berginisation is but small. On the other hand it must be observed that in Berginisation less gasoline and correspondingly less gas is formed initially than in the corresponding cracking experiments. In Berginisation cracking is restricted and the very reactive residues produced by cracking are converted into hydrocarbons of the gasoline and kerosene distillates. Polymerisation and the formation of coke from the unsaturated residues is thus prevented or diminished.

While cracking gives rise to residue poor in hydrogen, Berginisation prevents the loss of hydrogen from residues. In one Berginisation experiment a residue was obtained which gave 13.8 per cent. of hydrogen, whereas the raw material contained 14.8 per cent. In a corresponding cracking experiment the residue contained only 8.2 per cent. of hydrogen.

Berginisation must be considered as a combined cracking and hydrogenation process. The useful feature of cracking, the breaking down of hydrocarbon molecules, remains, but is made more regular, while the products are obtained in a

more stable condition on account of the addition of hydrogen, so that extensive polymerisation and formation of coke are avoided. The main feature of Berginisation, is, therefore, not the saturation of unsaturated hydrocarbons already present. In this respect it differs widely from the ordinary hydrogenation of vegetable or animal oils, which is conducted in the presence of catalysts.

This investigation clears up the scientific significance of the Bergius hydrogenation process. In continuation of this research the isolation, as far as possible, of the chemical compounds formed will be attempted, while our results on the hydrogenation of coal by the Bergius method will be published shortly.

## Society of Chemical Industry

### Papers Before the Manchester Section

A MEETING of the Manchester Section of the Society of Chemical Industry was held at the Textile Institute, Manchester, on Friday, February 5, Dr. E. Arden presiding.

#### Acceleration of Vulcanisation

A paper on "The Acceleration of Vulcanisation, Part 1," was read by W. J. S. NAUNTON, M.A., M.Sc., F.I.C. After stating the three ways of accelerating the process of vulcanisation, Mr. Naunton said that an accelerator might be defined as a substance which, when added to a rubber-sulphur mix, would reduce the time necessary to effect vulcanisation. It could not be described as a catalyst since there was little doubt that most accelerators actually took part in the reaction in an irreversible way. Organic accelerators had been developed out of "softeners" and "anti-agers," and it was interesting to note that in the modern development of these bodies the actual accelerating action was often incidental and their real value lay in their effect upon the physical properties of the vulcanisate or upon enhanced ageing properties; in fact a more apt definition would be that an accelerator was a substance which, when added to a rubber-sulphur mix, would give a vulcanised product with better properties than would be obtained from the same mix without its use.

The advantages to be gained by the use of accelerators were shortening of the time of cure, improving the mechanical properties of the vulcanisate, improving the ageing qualities, avoidance of "blooming" since the free sulphur in the vulcanisate was reduced to a minimum, vulcanising at low temperature, softening of the mix, and lessening of the variability of raw rubber. Lastly, there were many small practical "dodges" employed with accelerators in the rubber works, such as the use of different accelerators in different layers of thick goods to overcome the bad conductivity of rubber, or painting a fabric with a solution of the accelerator before treatment with rubber in order to obtain a better binding between the rubber and the fabric. Litharge decreased the activity of *p*-nitrosodiphenylaniline. Antimony pentasulphide was said to reduce the effectiveness of diphenylguanidine, though in this case Scott had found that the effect could be minimised by the addition of increased quantities of zinc oxide. Rubber substitutes retarded the action of the most of basic accelerators, but this was probably due to the traces of acid usually present in them. The action and testing of a large number of accelerators was described and the literature referred to in detail.

#### Alpha-Naphthol in Beta-Naphthol

A second paper, on "The Detection and Determination of Small Amounts of Alpha-Naphthol in Beta-Naphthol," was read by T. CALLAN, M.Sc., Ph.D., F.I.C.

Dr. Callan said that in a recent communication dealing with the detection of small amounts of *a*-naphthol in *b*-naphthol Driver stated that "the usual methods of detection leave much to be desired." The only method, however, to which he definitely referred was that of the British Pharmacopœia, which he stated had the advantage of simplicity but did not give satisfactory indications of the presence of *a*-naphthol in *b*-naphthol when the proportion of the former was very small. Driver therefore had suggested a new test which was presumably more sensitive than "the usual methods of detection" and which was carried out by dissolving 0.5 gm. of the sample in 20 cc. of 10 per cent. caustic soda, then adding 10 cc. of carbon tetrachloride and a little copper powder and heating to boiling for 30 minutes. *a*-Naphthol gave a pure deep

blue solution, slowly changing to green on exposure to air, whilst *b*-naphthol gave a pale yellow solution. This test was stated to be so sensitive that the presence of 0.005 gm. of *a*-naphthol in 0.5 gm. *b*-naphthol was sufficient to give the solution a distinct green tinge, i.e., the test was sensitive to the order of about 1 per cent. *a*-naphthol. *b*-Naphthol for many technical purposes, particularly in the colour industry, required, however, to be of a much higher degree of purity than this, and a sample of *b*-naphthol containing as much as 1 per cent. of *a*-naphthol would be regarded as an exceptionally bad sample, the *a*-naphthol content of good quality technical *b*-naphthol varying usually between 0.1 and 0.4 per cent. A test indicating a minimum of 1.0 per cent. was thus of little use as a criterion of technical *b*-naphthol and it was therefore thought desirable to investigate the sensitivity of some of the published methods for the detection and determination of traces of *a*-naphthol in *b*-naphthol and compare them with the new test suggested by Driver. A considerable number of methods had from time to time been put forward and of these some had been selected by Dr. Callan as giving the most satisfactory results and as being convenient to carry out without requiring the preparation of special reagents.

Dr. Callan then dealt with a number of methods of testing, including those of Leger, Volchy-Boucher, Artzberger, Dane, Liebmann and Prochazka.

#### Lead Glaze Dangers

As a result of representations made to the Ministry of Health that certain kinds of earthenware casseroles on sale in this country were glazed with a raw lead glaze, which was soluble to some extent in foodstuffs cooked or stored in the vessels, an investigation was conducted by Dr. Monier-Williams, chemist in the Foods Division of the Department, and his report is now issued. In practically all of the earthenware manufactured in this country for culinary purposes leadless glaze has been used for some years, but of late there has been an increasing importation from the Continent of casseroles, dishes and similar articles in which a glaze of high lead content is used. Dr. Monier-Williams has investigated the action of citric acid solutions and of various foodstuffs upon a number of these vessels, and he shows that, while there is no serious risk of lead poisoning arising from their ordinary use in cooking, yet under certain conditions, which might possibly occur in domestic usage, excessive quantities of lead may be dissolved from the glaze.

"It would seem," says the report, "to be a comparatively easy matter for the manufacturer to produce ware in which the solubility of the lead is reduced to a negligible amount, but much of the ware examined in the course of this investigation gave results which indicated lack of care in the preparation and firing of the glaze. It is hoped that the publication of these results will bring home to manufacturers the necessity of exercising more careful supervision over the temperature and duration of firing in the kiln, and the importance of using leadless glaze wherever possible."

In view of an outbreak of lead poisoning in 1922, due to the use of enamelled tanks containing lead for the storage of beer, it was considered advisable to extend the inquiries to enamelled hollow-ware. Dr. Monier-Williams has examined the enamels used on a number of vessels obtained from different sources, and has found that the danger of injurious substances being taken up in insignificant amounts by foodstuffs from domestic enamelled ware is remote. In one instance, however, a considerable quantity of boric acid was dissolved from the enamel of a frying pan.

#### Paints and Paint Making

At the joint meeting of the Bristol Section of the Society of Chemical Industry and the local section of the Institute of Chemistry at the University of Bristol, a paper on "Paint and Paint Making," was read by Mr. M. W. Jones, Chairman of the Bristol Section of the Society of Chemical Industry. After describing the essential features of a good paint, the lecturer passed in review the nature, characteristics, and origin of the raw materials used, dealing first of all with the pigments, both natural and manufactured, and, secondly, with linseed oil and turpentine. In showing the important part played by linseed oil in the formation of the necessary binding film, he gave some striking instances of failure in this respect.

## French Chemical Industry Notes

(FROM OUR OWN CORRESPONDENT.)

THE Society for Encouraging National Industry in France was recently addressed by M. Patart, who gave the results of his efforts to realise industrial synthetic methylic alcohol by catalysis under pressure.

In a comparison between the methods adopted for the respective syntheses of ammonia and methylic alcohol the lecturer dwelt on the differences between the two analogous reactions. The union of carbonic oxide and hydrogen could lead, he said, to the synthesis of formic aldehyde or ethylene, but it did not produce methane except under certain special conditions. He epitomised the preliminary work of Berthelot, Sabatier, and Le Chatelier, and other predecessors, and described in detail the researches of the Badische Anilin which were begun in 1913 and resumed in 1923 after a close study by the Germans of the French investigations. The work of English chemists in the same domain was signalised as valuable and important. As early as 1921 the work of M. Patart and his collaborators had so far progressed that they were able to patent the process to which they owed the already realised acquisitions. In the patent thus taken out it was specified that the synthesis of methylic alcohol could be obtained by passing two volumes of oxide of carbon and one volume of hydrogen over catalyst agents, under high pressures and at temperatures ranging from 360° to 600° C.

### Model of an Industrial Installation

With the co-operation of the *Service des Poudres*, the Direction of the Artillery, and the Office of Petrol and Liquid Fuels, it became possible to industrialise the laboratory researches. For this purpose an installation of a reduced model, including a gasometer, a purifier, and a catalyser were made. Systematic experiments were pursued by M. Patart and his assistants, an exhaustive study being made of each metal and metallic oxide, the catalysing activity of which was indicated in a table established by Sabatier and Mailhe, of Toulon. It was found that the catalysing oxides when mixed gave higher outputs (and at a lower temperature) than when they were individually employed. M. Patart stated that he had obtained, per hour, 100 cubic centimetres of methylic alcohol for 200 cubic centimetres of catalyst, which corresponded exactly to the yield registered in the synthesis of ammonia. The raw alcohol thus produced had a marsh odour due to amines of which it was easy to rid it by rectification, but it contained neither aldehyde nor acetone. M. Patart added that by employing certain catalysts the same secondary products were obtained as those furnished by fermentations due to yeasts.

### The Production of Artificial Pearls

The manufacture of artificial pearls as an industry has two branches, one of which "reconstitutes" pearls by utilising the more or less nacreous parts of oyster shells which are submitted to a very complex and tedious chemical treatment. The gems thereby obtained have a perfect resemblance to the natural pearl. The second branch devotes itself to the production of so-called "imitation" pearls created by means of small hollow glass balls or beads, the interior of which is coated with a nacreous composition, treated with gelatine or collodion. They are also manufactured with enamel or nacre spheres successively steeped in collodion or acetate of cellulose. Beautiful iridescence can be realised by incorporating bichlorate of tin with the above-mentioned bodies or by applying a coating of tetrachloride of titanium to glass pearls.

The latest and most successful process has been devised by Messrs. Clement and Rivière, two chemists, who have attempted to reproduce as far as possible the chemical conditions that determine the formation of nacre in oysters. To a solution of gelatine they add a salt of lime. This is applied to glass balls which become coated with jelly on the cooling of the gelatine. The beads are then immersed in another solution containing carbonate and phosphate of soda and albumen. Carbonate of lime is formed on the surface of the future pearls. The transformed balls are next washed and afterwards formolised so as to render the coating insoluble. The pearls procured by this process are so brilliantly iridescent that they are easily mistaken for natural pearls.

## Sir John Cass Technical Institute

### Prize Distribution and Paper on "The Fermentation Industries"

THE prizes and certificates gained by students of the Sir John Cass Technical Institute during the session 1923-24 were distributed on Tuesday, February 10, by Mr. Sydney O. Nevile, a Past-President of the Institute of Brewing.

#### Review of Institute's Activities

The Chairman, REV. J. F. MARR, in his statement of the work of the Institute during the session 1923-24, commented first upon the value of the training given by such bodies, and quoted extracts from the report of H.M. Inspectors which testified to the satisfactory character of the work of the Institute. The Institute had again been compelled to proceed along lines of the strictest economy, and it had been the chief aim to strengthen the main departments of the work and to increase the efficiency of the instruction given.

During the session under review, the total number of individual students was slightly less than that of the two previous years, but, at the same time, there was an increase of 14.9 per cent. in the total number of student hours. This total, the highest yet recorded, was to be attributed chiefly to the extension of the hours of laboratory instruction in the science departments. Post-graduate work had been continued with success, 17 investigations having been published, bringing the total number of original contributions published from the Institute to 154. Two members had obtained the degree of Ph.D., and three the degree of M.Sc., in each case as the result of theses based on research carried out in the chemistry departments. In addition, a grant of £250 had been made by the Department of Scientific and Industrial Research to a student in the Department of Organic Chemistry for research to be carried out at the Institute under the supervision of the Head of the Department.

Dealing specifically with the several departments of the work, the Chairman said that three successes had been gained at the examinations of the Institute of Chemistry by students in the Chemistry Departments, one having been awarded the Fellowship and two the Associateship of the Institute. The session 1923-24 formed the third year of the work of the Department of Petroleum Technology, and thus completed the period for which the donations from the contributing oil companies were initially granted. These companies had decided to continue their generous financial support to this section of the work for a further period. The Chairman also recorded the Institute's indebtedness to the members of the Consultative Committee on Petroleum Technology for the help and encouragement they had continued to give, and for doing so much to maintain the happy relationship that existed with the industry.

In the Department of Metallurgy, one student had passed the examination in Metallurgical Chemistry for the Associateship of the Institute of Chemistry.

The courses of instruction given in the Department of the Fermentation industries were specially designed for those engaged in the practical and scientific control of breweries, maltings and other fermentation industries, in order that they might acquire a knowledge of the technology and principles underlying their daily operations. The courses also met the requirements of the examinations of the Institute of Brewing. Since the Department was inaugurated, in the session 1906-7, approximately 2,000 class entries had been recorded. The Chairman acknowledged the Institute's indebtedness to the members of the Consultative Committee, which is composed of eminent men associated with the industry, for their valuable assistance to the work of the Department. Mr. Nevile had given valuable assistance on this Committee since its inception.

Mr. NEVILE then distributed the prizes and certificates.

#### The Fermentation Industries

In his lecture, Mr. S. O. NEVILE dealt first with industrial development generally, and said that the two urgent needs of modern industry were, firstly, the means whereby those having a talent for research might acquire the necessary knowledge and training, and, secondly, the opportunities to enable the rising generation of industrial workers to learn the principles of their work. Technical institutes such as the Sir John Cass Institute supplied these urgent requirements.

The fermentation industries afforded an instance of the



application of a continually increasing degree of research and scientific methods extended over many years. For a long time the word "Fermentation" was limited to its application to fermented beverages, but to-day the modern conception of fermentation might be taken to cover all those industries which depended on the control and utilisation of services of micro-organisms for the benefit of mankind. Thus the field was a wide one, including such industries as sanitation, water supply, foodstuffs manufacture and industrial alcohol.

The lecturer then outlined the process of brewing, and drew attention to features of Continental practice. There were two kinds of beer, namely, the English, which was called "top" fermentation beer, and the Continental type of beer, or lager beer, called "bottom" fermentation beer.

#### Institute of Brewing

The Institute of Brewing, in addition to encouraging research into the different problems which confronted the industry, had also taken steps to encourage those entering the business as technical brewers to equip themselves with the knowledge necessary to apply in their daily operations the discoveries already made, and which were looked for in future. To this end they had established an examination, which not only served as a test of what the student knew, but established a standard of the kind of education which young men should undergo before accepting responsible positions in the industry. The courses of education conducted as part of the activities of the Sir John Cass Institute were arranged with an eye to enabling those who were unable to take full-time courses to qualify themselves for the Institute of Brewing examination.

There was an exhibition of apparatus and students' work at the Institute, one of the exhibits being the microscope mentioned by Mr. Neville as having been used by Pasteur.

## The Romance of Metallurgy

### Professor Thompson's Lectures

At the University of Manchester on Friday, February 6, in the second of a series of lectures on "The Romance of Metallurgy," Professor F. C. Thompson took as his subject "Crystals in Metals." He said in most cases the metal crystal superficially was an irregular mass; it was only when the internal structure was examined that one realised that it was truly crystalline. So far as was known all metals and all alloys in the solid condition were perfectly crystalline; there was no evidence that a metal had ever been obtained in a solid state in an amorphous condition. It was possible that as a result of very severe cold-work the crystals might be partly turned into amorphous modifications, but even that was uncertain. Knowledge on the subject had been largely built up as the result of the work of the Braggs. Previously there were speculations or theories as to the manner in which atoms existed in the crystals, and it was a pleasing feature of the work of the Braggs that it had almost invariably confirmed the speculations of the older crystallographers.

By a series of lantern slides Professor Thompson showed the manner in which crystals were formed in the solidification of the molten metal. Dealing with the arrangement of the atoms inside the crystal he pointed out that in the great majority of metals the crystal structure was a cubic system of five atoms, one at each corner of the cube and one at the centre of the face.

One of the most curious things about metals was the number of cases where there were allotropic modifications; that is to say, where the form in which the metal crystallised at a certain temperature suddenly altered when another temperature was reached. Iron underwent such allotropic modification, cadmium did, and tin also. Probably half the known metals did. If iron was heated to a sufficiently high temperature an allotropic change took place in which the system of the iron crystal remained cubical but suddenly passed from an open-packed structure, in which one atom was in contact with eight others, to a close-packed structure where each atom was in contact with twelve others. When that happened the magnetic property associated with iron disappeared but was restored when the iron ceased to be heated and returned to its former state.

## Chemistry in Its Relation to Agriculture

### Lectures at Birmingham University

The first of a series of eight public lectures on "Chemistry in its Relation to Agriculture," by Mr. E. Holmes, was given in the Chemistry Department of the University of Birmingham on February 4, the lecture being of an introductory character.

Opening with a reference to the enormous field of human endeavour comprehended by the term agriculture, followed by a tribute to the pioneering work of British agriculturists and chemists, the lecturer traced the history of his subject from the recognition of the value of alkaline phosphates as fertilisers, by the Earl of Dundonald in 1795, to the work of Priestley, Scheele, and Ingen-Housz on plant respiration. The systematic method of experiment of de Saussure was outlined and shown to be the basis of the subsequent work of Boussingault, Lawes, and Gilbert. Humphry Davy's book of 1813 and Liebig's report to the British Association of 1840 were shown to be important critical examinations of the existing knowledge in agriculture, and although productive of much controversy yet were very stimulating to scientific agriculture. Liebig's mineral replacement theory was outlined and his application of the Law of Minimum quoted as follows:—"By the deficiency of one necessary constituent, all the others being present, the soil is rendered barren for all crops to the life of which that one is indispensable." Ville's work on the dominant factor in the manuring of crops led to the conclusion that nitrogen was the dominant factor for cereals and beetroot, phosphate for the sugar cane, and potash for potatoes. Nitrification in soils, that is the conversion of ammonia to nitrates, was traced down to soil bacteria by Warington, working at Rothamsted, and it was shown that no plants can take up atmospheric nitrogen directly, but that the *leguminosae* (plants like peas and beans) do so through the agency of their associated root nodule bacteria.

Soils have been classified by the soil physicist, chiefly from considerations of particle size, as sands, clays, silts, and loams. Since many soil processes occur on the surface of the particles it is apparent that Zunker's coefficient "specific surface," which refers the total particle surface of a quantity of soil to that of an arbitrary standard, gives a useful indication of soil requirements in the matter of amount and depth of drainage. The composition of the soil is fluctuating continually, due to drainage, cropping, fixation of atmospheric nitrogen, and manuring.

The various factors as food, air, temperature and root room which govern plant growth were discussed, and it was shown that increase of any or all of these factors increased plant growth up to a limit set by the ultimate powers of growth of the particular species.

### Recognised Plant Nutrients

After reference to the low water requirement of grain crops and the high requirement of legumes and grasses, the conventional plant nutrients were given as carbon, hydrogen, oxygen, nitrogen, phosphorus, sulphur, potassium, calcium, magnesium, sodium and iron. In recent years Bertrand and Mazé, working in France, have extended this list to include traces of boron, fluorine, iodine, chlorine, silicon, aluminium, manganese, and zinc. The specific effects of various elements and their compounds on plant growth in pot cultures and in field trials were noted, and in particular it was pointed out that excess of nitrogenous manures will give a great increase of growth but also weakens the tissues so that cereal crops tend to become "laid" and leaf crops like cabbages, while having a bright green colour are rendered liable to damage by handling on the market. Potash starved plants lose the power of making starch, this fact accounting for the efficacy of potash for such crops as mangolds, potatoes, and sugar beet. Although chlorophyll, the green colouring matter of plants, is a magnesium compound, it has been proved that the plant requires traces of iron and manganese before any chlorophyll can be produced.

Reference was made to the absolute necessity of organic or humic matter in agricultural soils. It makes for easier cultivation and gives a soil a greater holding capacity for water—an important factor in dry seasons. The lecture closed with some theories of the chemical composition of this complicated mixture.

## From Week to Week

THE SPRING SESSION OF THE COLOGNE FAIR will be held from March 22 to 31.

AN EXPLOSION OF OXYGEN CYLINDERS at a Moscow lorry works resulted in the death of four persons and injuries to others.

THE DEATH is announced of Professor Hermann Schunck, a former director of the Badische-Anilin- und Soda-Fabrik, at Ludwigshafen.

THE MAJORITY OF BRITISH BANKING CREDITS granted to Czecho-slovakian sugar industries have been repaid, according to local reports.

PROFESSOR J. C. PHILIP, F.R.S., lectured on "The Development of Physical Chemistry" to Sheffield University Chemical Society on February 6.

A PRESENTATION has been made by the staff and workers of the United Alkali Co. to Mr. S. D. Matthews, who is retiring after 40 years' service with the firm.

THE DEATH IS ANNOUNCED OF Mr. T. H. W. Idris, founder of the well-known firm of mineral water manufacturers. Mr. Idris was a past-president of the British Pharmaceutical Society.

THE LONDON FIRE BRIGADE has placed an order for a 600-gallon "Foamite" engine mounted upon a 50 h.p. Tilling-Stevens chassis. The foam output of this unit is approximately 5,000 gallons.

THE DEGREE OF D.Sc. (CHEMISTRY) has been conferred on Mr. George Dean (West Ham Municipal College) by London University for a thesis entitled "The Atomic Weights of Carbon and Silver."

THE DEATH IS ANNOUNCED OF Mr. F. Russig, a well-known tar technologist, a director of the Oberschlesische Kokswerke und Chemische Fabriken A.-G., and of the Chem. Werke Oberschlesien G.m.b.H.

MR. JUSTICE ROMER on Tuesday ordered the petition for the winding up of Clement and Johnson, Ltd., proprietors of Yadil, to stand over for two weeks to enable the directors to dispose of leasehold premises.

A VERDICT of death from accidental causes was recorded in the case of the death of an isinglass cutter employed by Sir W. Wayland and Co., U.K. Works, Deptford. The man, who was caught in moving machinery, was thought to have been oiling bearings while the plant was in motion.

AN INCREASE IN GERMAN POTASH PRICES is anticipated in order to secure any material advantage from the prospective increase in exports to the United States. In addition to losing a section of this market to Alsace, under an agreement, the United States is now estimated to be producing 10 per cent. of its own potash needs.

THE DEUTSCHE FARBENFABRIKEN recently concluded an agreement with the "Russgertorg" (Russo-German Trade Shareholding Co.) to maintain a stock of 500,000 kilograms of dyes on the premises of the "Russgertorg." Since the conclusion of the agreement 200,000 kilograms of dyestuffs have reached Russia from Germany, and the total annual export to Russia in future is estimated at 2,000,000 kilograms.

THE DEATH IS ANNOUNCED in London of Dr. Horace Tabberer Brown, who carried out valuable chemical research, especially on fermentation problems. Dr. Brown, who was born at Burton-on-Trent in 1848, was educated at the Trent and Atherstone Grammar Schools and the Royal College of Chemistry. He entered the brewing business at Burton in 1866, retiring in 1893. He was awarded the Longstaff Medal of the Chemical Society in 1894, and was also the recipient of the Royal and Copley medals of the Royal Society.

AT THE ROYAL INSTITUTION, London, on February 5, Sir William Bragg lectured on "The Structure of Quartz," and considered the position of the atoms inside the crystal. Experiments showed that in a crystal which was regularly arranged, the atoms and molecules were stratified, and the first problem was to measure the distance between the layers of stratification. This was shown by the angle of reflection as disclosed by the X-rays. It was further found that the quartz must possess a screw-like structure. Sir William illustrated this by a few experiments with polarised light, which brought out clearly the screw-like formation.

A BRITISH CHAMBER OF COMMERCE is to be opened at Hamburg on Monday next by Lord D'Abernon.

A SUGAR BEET FACTORY is to be established in the Irish Free State by the proprietors of the Skoda Works, in Czecho-slovakia, according to reports from Dublin.

MANCHESTER UNIVERSITY reports that Brunner, Mond and Co., Ltd., have continued their grants in aid of research in the departments of physics and chemistry.

COLONEL THE HON. VERNON WILLEY is to be recommended by the Grand Council of the Federation of British Industries to be the new president in succession to Sir Eric Geddes.

SIR MAX MUSPRATT has contributed £1,000 to the Endowment Fund in connection with the Liverpool University Settlement's project for erecting a building for boys' clubs.

THE PRINCE OF WALES has consented to become an honorary life member of the Institution of Gas Engineers, and Mr. Fred West (Lord Mayor of Manchester) has been nominated by the Council for honorary membership.

PROFESSOR ALEXANDER FINDLAY, of the chemistry department of the University of Aberdeen, has been appointed acting professor of chemistry at Stanford University, California, for the winter, spring, and summer seasons.

DR. CHARLES CARPENTER has informed the Council of the Institution of Gas Engineers, that in consequence of his doctor's orders he is unable to accept the Council's nomination as president of the Institution for 1925-26.

TWO FRENCH FERTILISER manufacturers have begun the commercial manufacture of a product carrying both nitrogen and phosphoric acid. It will be sold under the name "phosphazote." The nitrogen is derived from cyanamide.

MR. JAMES HOPWOOD JEANS, D.Sc., F.R.S., Secretary of the Royal Society, and Sir William Henry Ellis, G.B.E., have been appointed by Orders of Council to be members of the Advisory Council to the Committee of the Privy Council for Scientific and Industrial Research.

MR. E. J. HOLMYARD, in a lecture on "Alchemy and Medieval Islam," before the Bristol Society for the promotion of Eastern Research, said that the Arabs knew how to extract essential oils by steam distillation; they were also acquainted with dry distillation and filtration and could prepare an amalgam of iron.

A PRESENTATION of his portrait in oils has been made to Mr. F. W. Clark, chairman of the Salt Manufacturers' Association and managing director of the Salt Union, Ltd., by associates of his company in the trade. Colonel Wright, chairman of the Stafford Alkali Co., which company entertained the trade for this occasion, made the presentation. Mr. Clark has been connected with the industry for 43 years.

AFTER A HEARING LASTING FOUR DAYS the Manchester City Stipendiary Magistrate on Tuesday committed for trial at the Assizes, on charges of conspiracy to defraud, Frederick William Merryweather, of Crumpsall; Archibald Douglas, of Patricroft; Henry Powell Hudson, of Stockport; and Harold Dennis Gould, of Prestwich. One of the charges is that of an alleged fraudulent attempt to obtain a quantity of permanganate of potash from Johnson and Sons, manufacturing chemists. (THE CHEMICAL AGE, January 31.)

THE CZECHO-SLOVAK CHEMICAL INDUSTRY now embraces 18 factories manufacturing soap, candles and glycerine, and 18 manufacturing vegetable oils, varnishes and lacs (especially colza oil). The nine petroleum refineries work up Galician and Roumanian naphtha to the extent of about 33,000 tanks per annum. The maximum home production is estimated at 20,000 tanks. Dry wood distillation is conducted in eight establishments, using 200,000 cubic metres of wood every year, from which they make charcoal, calcium acetate, methyl alcohol, and wood tar. Coal-tar is distilled in 84 establishments.

STUDENTS from the graduate section of the North-East Coast Institution visited the works of the Team By-Product Co., Dunston, on February 7. There was demonstrated how the recovery of sulphate of ammonia, tar, naphthalene, and benzol is done in the by-product plant. After the extraction of these products, the gas is returned underneath the ovens, for heating purposes, and the surplus gas sent to Dunston Power Station of the Newcastle Electrical Supply Company, about 1½ miles away, for steam raising and generation of electricity. It was shown in the distillation plant how the various distillates were driven off, by varying temperatures, the products including light oils, creosote, and anthracene.

## Carbon Monoxide and Its Estimation

### The Society of Chemical Industry in the Midlands

PROFESSOR MORGAN presided on Tuesday, February 3rd, at the meeting of the Birmingham and Midland Section of the Society of Chemical Industry, when a paper on "The Use of Dehydrated Iodic Acid in the Estimation of Carbon Monoxide" was read by Messrs. J. IVON-GRAHAM and F. LAWRENCE.

The determination of small quantities of carbon monoxide in mine air by means of dehydrated iodic acid had previously been advocated by one of the authors and a special apparatus for use in mines described (*J.S.C.I.*, 1919, Vol. XXXVIII, pp. 10-14r). In the present paper the authors discussed the precautions necessary in the analytical operations involved, and described experiments undertaken to ascertain the cause of low results sometimes obtained in the estimation of CO with certain samples of dehydrated iodic acid. These investigations had shown that when  $\text{HIO}_3$  was heated for some time at  $240^\circ \text{C}$ . or thereabouts (the  $\text{HIO}_3$  being thus converted completely into  $\text{I}_2\text{O}_5$ ) a product was obtained which reacted much more slowly and under the analytical conditions employed in the estimation of small quantities of CO consequently gave low results. When, however, a small amount of moisture was present, the product worked exceedingly well. The formation of the molecular compound  $\text{HIO}_3 \cdot \text{I}_2\text{O}_5$  was confirmed and the probability of the formation of other molecular compounds, intermediate in composition between  $\text{HIO}_3 \cdot \text{I}_2\text{O}_5$  and  $\text{HIO}_3$  on the one hand and  $\text{I}_2\text{O}_5$  on the other was indicated. The influence of these anhydro-acids on the rate of oxidation of carbon monoxide was discussed, and although the results of the investigations, so far carried out, had not indicated that the oxidation of carbon monoxide resulted from the action of any one particular molecular compound, neither did they altogether explain the absence of activity in certain cases, the authors considered that the method of estimation by means of dehydrated iodic acid was still the best available for small quantities of CO. By careful dehydration and testing of the resultant product with standard CO mixtures and with the analytical precautions indicated in the paper, an accuracy of 0.0005 per cent. might be obtained by titration of the liberated iodine with freshly prepared  $\frac{N}{500}$  thiosulphate, using a special 1 cu. burette.

The use of the "Hoolamite" detector for carbon monoxide and the recent work of Lamb, Philips and Carleton (*J. Amer. C.S.*, 1924, p. 2017) on the oxidising action of  $\text{HIO}_3$  dissolved in aqueous sulphuric acid was also referred to.

DR. T. SLATER PRICE, F.R.S. (Director of Research, British Photographic Research Association) read a paper on "The Action of Light on the Photographic Plate."

## Society of Public Analysts

### New Officers for the Year

THE annual general meeting of the Society was held at the Chemical Society's Rooms, Burlington House, on Wednesday, February 4, when the President (Mr. Rudd Thompson) delivered his annual address.

The following were elected officers and council for the ensuing year:—President, Mr. G. Rudd Thompson; Past-Presidents, serving on the council, Messrs. Leonard Archbutt, A. Chaston Chapman, Bernard Dyer, P. A. Ellis Richards, Alfred Smetham, E. W. Voelcker and J. Augustus Voelcker; Vice-Presidents, Messrs. S. F. Burford, E. M. Hawkins, and A. More; Hon. Treasurer, Mr. Edward Hinks; Hon. Secretary, Mr. E. Richards Bolton; and Assistant Hon. Secretary, Mr. R. G. Pelly; other members of council, Messrs. F. W. F. Arnaud, E. T. Brewis, R. T. Colgate, R. L. Collett, J. C. Drummond, C. A. Hill, L. H. Lampitt, T. Macara, S. E. Melling, J. Sorley, A. R. Tankard, and J. White.

At an ordinary meeting on the same date certificates were read for the first time in favour of Messrs. D. J. T. Bagnall, A.C.G.F.C., A.I.C., R. H. Coysh, M.Sc., A.I.C., G. Van Barneveld Gilmour, B.Sc., A.R.C.Sc.I., A.I.C., P. May, D.Sc., F.I.C., J. Parry, W. Smith, B.Sc., A.I.C., and Winifred Wright, B.Sc., A.I.C. Certificate was read for the second time in favour of Mr. Thomas Mann.

The following were elected members:—Messrs. A. C. Barnes, B.Sc., F.I.C., J. J. Fox, D.Sc. (Lond.), F.I.C., T. C. Hay and H. R. Jensen, M.Sc. (Liv.), A.I.C.

### Abstracts of Papers

In a paper on "Cinchonine as a Tannin Precipitant with Special Reference to the Analysis of Cutch and Gambier," Dr. David Hooper pointed out that the cinchonine method of A. Chaston Chapman, elaborated by him for the determination of tannin in hops, had been extended with concordant results to a number of other tannin-containing materials. The method had been found of special value for the determination of tannin in cutch and gambier, since cinchonine did not precipitate catechin. Hide-powder, on the other hand, absorbed catechin.

It was stated in a paper on "The Examination of Charred Documents" by Mr. C. Ainsworth Mitchell, M.A., F.I.C., that various methods of deciphering charred documents had been studied and an effective process of development by calcination devised. This also afforded a means of distinguishing between certain kinds of printing inks, typing inks, and coloured pigments, and even, in some cases, of determining the sequence of the strokes in writing. The relative value of thorium, cerium, and aluminium salts for strengthening charred fragments before calcination had been ascertained. Thiocyanic acid vapour had been found a useful reagent for developing illegible writing in iron-gall ink on charred paper; its sensitiveness as a test for iron had been determined. The photographic method of deciphering burned documents had also been examined, and had been found to have only a very limited applicability.

"The Absorption of Carbon Monoxides in Gas Analysis" was the subject of a paper by Mr. H. R. Ambler, B.Sc., A.I.C. An investigation was described into the conditions governing the absorption of carbon monoxide by acid and ammoniacal solutions of cuprous chloride, and by a suspension of cuprous oxide in sulphuric acid containing  $\beta$ -naphthol. Figures were given showing the effect of previously absorbed carbon monoxide on the absorptive power of these reagents. The acid solution of cuprous chloride in no case brought about complete absorption; the ammoniacal solution only when the amount previously absorbed was very small. The cuprous oxide suspension gave complete absorption even when it had absorbed considerable quantities of carbon monoxide. Absorption by this reagent was slower than with cuprous chloride solutions.

### Heroic Dyeworker

FOR the finest life-saving deed of the year, George Ingham has been awarded the Stanhope Gold Medal of the Royal Humane Society.

Ingham is employed at the Smedley Ridge dyeworks, Lower Crumpsall, Manchester. On January 30 last year two men, named Marriott and Bamford, entered a "kier," and were overcome by the fumes of tetralene. A "kier" is a perpendicular boiler, over 9 ft. deep and 7 ft. wide. It is dark inside and the men enter it by a ladder. Ingham and another workman named Porter—who has received the Society's vellum testimonial—went down into the "kier" and got Marriott out in time to save his life. Ingham then went down again to try to save Bamford, but failed, and came out; but as soon as he had recovered from the fumes he got a rope and went down a third time. He tied the rope round Bamford and got him out, but it was too late.

### Alleged Unfair Use of Letter

MR. UPJOHN, K.C., mentioned to Mr. Justice Romer, in the Chancery Division, on Friday, February 6, a motion in the action, *British Oxygen Co., Ltd., v. Liquid Air, Ltd.* He said that it was for an injunction restraining the defendants from publishing a certain letter written by one of the plaintiff company's district managers in Lancashire to a customer making a quotation for supplying oxygen for commercial purposes. The importance of the matter was that a private letter making a quotation to a customer had been used on the Stock Exchange in a way which he hoped to satisfy his lordship was most unfair. He asked for a week's adjournment on the defendants giving an undertaking, and this was granted.



# References to Current Literature

## British

- COMBUSTION.—The combustion of coke in one stage. Part II. G. Weyman. *J.S.C.I.*, February 6, 1925, pp. 51-60.
- INDIGO.—The formula for indigo. H. King. *J.S.C.I.*, February 6, 1925, pp. 135-136.
- COAL.—The oxidation of banded bituminous coal at low temperatures. Studies in the composition of coal. W. Francis and R. V. Wheeler. *Chem. Soc. Trans.*, January, 1925, pp. 112-125.
- On fusion and its oxidation. Studies in the composition of coal. F. V. Tidswell and R. V. Wheeler. *Chem. Soc. Trans.*, January, 1925, pp. 125-132.
- CATALYSIS.—The so-called poisoning of oxidising catalysts. C. Mouren and C. Dufraisse. *Chem. Soc. Trans.*, January, 1925, pp. 1-4.
- The adsorption of catalytically poisonous metals by platinum. Part I. The adsorption of lead and mercury. E. B. Maxted. *Chem. Soc. Trans.*, January, 1925, pp. 73-77.
- ACIDS.—Synthesis of arachidic acid and some long-chain compounds. N. K. Adam and J. W. W. Dyer. *Chem. Soc. Trans.*, January, 1925, pp. 70-73.
- Synthesis of certain higher aliphatic compounds. Part I. A synthesis of lactarinic acid and of oleic acid. G. M. Robinson and R. Robinson. *Chem. Soc. Trans.*, January, 1925, pp. 175-180.
- $\alpha$ -Dialdehydopropane- $\beta$ -dicarboxylic acid and  $\alpha$ -dialdehydopropane- $\beta$ -carboxylic acid. W. H. Perkin, jun., and H. S. Pink. *Chem. Soc. Trans.*, January, 1925, pp. 191-194.
- BROMINE.—A redetermination of the atomic weight of bromine. The inseparability of the isotopes by fractional crystallisation. P. L. Robinson and H. V. A. Briscoe. *Chem. Soc. Trans.*, January, 1925, pp. 138-150.
- HYDROGENATION.—The hydrogenation of a gas oil. H. G. Shatwell. *J. Inst. Petroleum Tech.*, December, 1924, pp. 903-911.
- Note on the so-called hydrogenation of gas oil. O. E. Mott and A. E. Dunstan. *J. Inst. Petroleum Tech.*, December, 1924, pp. 911-913.
- ANALYSIS.—Estimation of sulphur in volatile hydrocarbons, with particular reference to benzol, by an improved lamp method. E. L. Lomax and A. M. E. Bevan. *J. Inst. Petroleum Tech.*, December, 1924, pp. 914-917.
- Note on the determination of lead tetra-ethyl in motor spirit. W. R. Ormandy. *J. Inst. Petroleum Tech.*, December, 1924, p. 954.

## United States

- ADSORPTION.—Activated char for gold adsorption. R. H. McKee and P. M. Horton. *Chem. Met. Eng.*, January 26, 1925, pp. 164-167.
- Studies in the adsorption from solution from the standpoint of capillarity. Part I. W. A. Patrick and D. C. Jones. *J. Phys. Chem.*, January, 1925, pp. 1-10.
- The adsorption of vapours by alumina. L. A. Munro and F. M. G. Johnson. *J. Ind. Eng. Chem.*, January, 1925, pp. 88-92.
- FILMS.—Removal of gas films. W. D. Bancroft. *J. Phys. Chem.*, January, 1925, pp. 20-33.
- The structure of surface films on water. N. K. Adam. *J. Phys. Chem.*, January, 1925, pp. 87-101.
- HYDROGENATION.—Heterogeneous catalysis. Part II. Hydrogenation of marine oils. A. S. Richardson, C. A. Knuth and C. H. Milligan. *J. Ind. Eng. Chem.*, January, 1925, pp. 80-83.
- HYDROLYSIS.—Effect of sulphides on the alkaline hydrolysis of skin and hair. H. B. Merrill. *J. Ind. Eng. Chem.*, January, 1925, pp. 36-39.
- FATS.—The spontaneous decomposition of butter fat. C. A. Browne. *J. Ind. Eng. Chem.*, January, 1925, pp. 44-47.

- SULPHONATION.—Elimination of soluble tar from sulphonation masses. J. A. Ambler and D. F. J. Lynch. *J. Ind. Eng. Chem.*, January, 1925, pp. 61-62.
- PHOTO-CHEMISTRY.—The action of ultra-violet light upon carbon dioxide and water. C. W. Porter and H. C. Ramsperger. *J. Amer. Chem. Soc.*, January, 1925, pp. 79-82.
- Studies in the experimental technique of photo-chemistry. Part I. The quartz mercury lamp as a photo-chemical light source. L. Reeve. *J. Phys. Chem.*, January, 1925, pp. 39-57.
- DYESTUFFS.—The condensation of carbon tetrachloride and phenol: aurin. M. Gomberg and H. R. Snow. *J. Amer. Chem. Soc.*, January, 1925, pp. 198-211.
- Para-cymene studies. Part V. The bromination of 2-amino-para-cymene and certain new azo dyes. A. S. Wheeler and H. M. Taylor. *J. Amer. Chem. Soc.*, January, 1925, pp. 178-184.
- GERMANIUM COMPOUNDS.—Germanium. Part VIII. The physical properties of monogermane. R. B. Corey and A. W. Laubengayer. *J. Amer. Chem. Soc.*, January, 1925, pp. 112-117.

## French

- ACIDS.—Evolution of the manufacture of sulphuric acid by the chamber process in recent years. Part II. De Jussieu. *L'Ind. Chim.*, January, 1925, pp. 2-6.
- The molecular orientation of the fatty acids. J. J. Trillat. *Compt. rend.*, January 26, 1925, pp. 280-281.
- AMMONIA.—A comparison between the various methods for the direct synthesis of ammonia. Part V. P. Firmin. *L'Ind. Chim.*, January, 1925, pp. 11-15.
- COLLOIDS.—Colloid mills. The "Kek" machine. H. S. du Bellay. *Rev. Prod. Chim.*, January 31, 1925, pp. 41-43.
- LEAD.—Chemical studies of the lead isotopes. H. Brennen. *Compt. rend.*, January 26, 1925, pp. 282-284.
- REDUCTION.—The reduction of nitrogen oxides in the presence of sulphurous and sulphuric acids. A. Graire. *Compt. rend.*, January 26, 1925, pp. 292-294.
- CHLORINATION.—The chlorination of *p*-methyl-cyclohexanone. M. Godchot and P. Bedos. *Compt. rend.*, January 26, 1925, pp. 295-297.
- CATALYSIS.—The use in catalysis of alumina which has absorbed various other substances. A. Charrion. *Compt. rend.*, January 19, 1925, pp. 213-215.
- MERCURY COMPOUNDS.—The direct formation of mercury oxychlorides. H. Pélabon. *Compt. rend.*, January 12, 1925, pp. 143-145.
- MIGRATION.—The migratory capacity of the  $\alpha$ -naphthyl group. E. Luce. *Compt. rend.*, January 12, 1925, pp. 145-148.
- ANALYSIS.—The estimation of radium in uranium minerals containing tantalum, niobium and titanium. P. Curie. *Compt. rend.*, January 19, 1925, pp. 208-211.

## Miscellaneous

- ANALYSIS.—The antimony electrode as an indicator for hydrogen ions and its application in potentiometric titrations of acids and bases. I. M. Kolthoff and B. D. Hartog. *Rec. Trav. Chim. des Pays-Bas*, January 15, 1925, pp. 113-120.
- SUBSTITUTION.—The mechanism of substitution in the aromatic nucleus. E. de B. Barnett and J. W. Cook. *Rec. Trav. Chim. des Pays-Bas*, December 15, 1924, pp. 897-898.
- OXIDATION.—The reaction velocity of oxygen with some inorganic salts. I. The oxidation of nitrites. II. The catalytic oxidation of arsenites. W. Reinders and S. I. Vles. *Rec. Trav. Chim. des Pays-Bas*, January 15, 1925, pp. 1-46.
- Observations on the speed of oxidation of some aromatic derivatives of ethylene by means of benzoyl perhydropol. J. Böeseken and J. S. P. Blumberger. *Rec. Trav. Chim. des Pays-Bas*, January 15, 1925, pp. 90-95.

## Patent Literature

### Abstracts of Complete Specifications

226,475. OIL FROM VULCANISED RUBBER, MANUFACTURE OF. A. Bray, 155, Rue du Trone, Brussels. International Convention date, December 18, 1923.

The object is to obtain by the distillation of vulcanised rubber an oil which is a substitute for turpentine and is a solvent for rubber and copal. Very finely divided vulcanised rubber is distilled at normal or reduced pressure, either alone or in the presence of an alkali, an alkali carbonate, or an alkaline earth, to fix the sulphur. The distilling apparatus is provided with a reflux condenser to condense and return the heavy products such as sesqui and poly terpenes and to assist the formation of light products. To avoid the incrustation of the walls of the distilling apparatus a stirring device is provided, and the final product is a fine black powder.

In an alternative method, the vulcanised rubber may be dissolved by heating it in an autoclave at a pressure of 6-10 atmospheres with a suitable solvent and then distilled as before. The crude distillate is an oil of brown colour and strong odour, and contains tars and sulphur compounds. This oil is purified by distilling in the presence of a mineral acid such as sulphuric acid, phosphoric acid, meta-phosphoric acid, pyro-phosphoric acid, boric acid, etc. This coagulates the hot tars, eliminates the sulphur as sulphuretted hydrogen, and also acts as a depolymerising agent. The oil is further purified by agitating with a solution of sodium hypochlorite or sodium bisulphite, and then caustic soda. The oil is finally washed with water, separated by decantation or centrifugal action, and then filtered through a material such as Fuller's earth. The final product is a colourless liquid without odour, which resembles turpentine.

227,143. FILTRATION OF SOLUTIONS OF TIN AND TITANIUM. C. Weizmann and J. Blumenfeld, 16, Addison Crescent, London, W.14. Application date, August 3, 1923.

It has been found that a very rapid decantation of tin or titanium containing suspended matter may be obtained by introducing small quantities of other colloidal substances, preferably colloidal metallic sulphides. The colloidal sulphide added usually has an electric charge of opposite sign from that of the colloidal substance to be removed. In an example, the titanium solution is obtained by the action of sulphuric acid on ilmenite, the solution containing 200 grammes of  $\text{TiO}_2$  per litre. The solution is heated to  $50^\circ\text{C}$ ., and 0.5 grammes of  $\text{As}_2\text{O}_3$  per litre is then added. Sufficient iron sulphide is also added to precipitate the arsenic as sulphide, and the solution is then filtered or allowed to stand, and the clarified solution decanted from the arsenic sulphide.

227,147. OXYGENATED ORGANIC COMPOUNDS, MANUFACTURE OF. J. Y. Johnson, London. From Badische Anilin and Soda Fabrik, Ludwigshafen-on-Rhine, Germany. Application date, August 28, 1923.

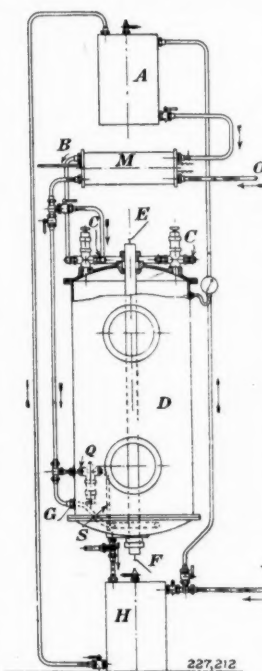
It is known that by the action of carbon monoxide or dioxide and hydrogen at a high temperature and pressure in the presence of a suitable catalyst, methanol and other oxygenated organic compounds can be obtained. A new catalyst for this process consists of mixtures of such oxides of metals of different groups of the periodic system as are non-reducible, and with an excess of the more basic oxide. The non-reducible oxides referred to are those which are not reduced by carbon monoxide or dioxide up to  $550^\circ\text{C}$ . A suitable mixture consists of chromium oxide with 2-12 molecular parts of zinc oxide. Other suitable combinations are oxides of zinc and uranium, zinc and vanadium, zinc and tungsten, magnesium and molybdenum, cerium and manganese. The catalysts should be kept free from iron, nickel and cobalt, and the gas mixture should be kept free from volatile iron and nickel compounds. The reaction is effected at  $200^\circ$ - $600^\circ\text{C}$ ., and a pressure above 50 atmospheres. The product is mainly methanol, which is separated by cooling without reduction of pressure, and the remaining gases are then treated again. A detailed example is given. Reference is directed in pursuance of Section 7, Sub-section 4, of the Patents and Designs Acts of 1907 and 1919 to Specification No. 20,488/1913.

227,177. PURIFYING OILS, PRODUCTION OF MATERIALS FOR. P. W. Prutzman and C. J. von Bibra, 2525, East 37th Street, Los Angeles, Cal., U.S.A. Application date, October 8, 1923.

When purifying petroleum oils by means of a neutralising mineral earth, the latter is usually dried and pulverised before use. Such material contains occluded air, which may be released if the temperature exceeds  $250^\circ\text{F}$ ., and may have a deteriorating effect on the oil. In this invention the purified material is mixed with water to a plastic condition and used in that form. In the preparation of the material, the plastic mass is treated with sulphuric acid to remove soluble constituents, and then washed with water to extract these substances. The material is then used in its wet condition, and access of air is avoided. The mixture of oil and purifying agent is heated to evaporate the water from the plastic material, and it is found that by this means the quantity of purifying material necessary is reduced to one half. Reference is directed in pursuance of Section 7, Sub-section 4, of the Patents and Designs Acts of 1907 and 1919 to Specifications No. 177,180, 163,505, 122,465, 11,614/1912, 14,364/1900.

227,212. OXIDATION OF OILS. H. Schofield, "Iffley," 145, Park Road, Loughborough, Leicestershire. Application date, October 16, 1923.

This apparatus is for oxidising oils by means of ultra-violet light. Raw linseed oil is forced from the vessel A through the



pipe B, immersed in hot liquid in the vessel M, and thence to a series of atomisers C arranged around the top of the vessel D. The bath M is electrically heated to any desired temperature. The flow of oil through each atomiser C is controlled by a needle valve, and the oil is sprayed by compressed air. The oil falls through the chamber D as a very fine mist, and is subjected to ultra-violet light obtained by a high tension electrical discharge through a quartz vacuum tube E, F, or by a quartz mercury vapour lamp. The air under pressure is heated by passing through the pipe O in the bath M, and is supplied to the atomiser C and to the ring G, the latter being perforated. This air is previously purified and dried, and is supplied at a temperature of about  $250^\circ\text{C}$ . The falling oil thus meets an upward current of heated air, which further increases the surface area of the heated oil. On reaching the bottom of the vessel D, the oil is picked up by atomisers Q through suction pipes S, and again sprayed into the vessel D, where it is again subjected to ultra-violet rays. The treated oil

is collected in the receiver H, and may be returned to the vessel A for further treatment.

227,217. FERTILISERS, MANUFACTURE OF. F. L. Schmidt, Aachen, Rhineland, Germany, and A. Messerschmitt, Suvigliana-Lugano, Switzerland. Application date, October 18, 1923.

This fertiliser is manufactured by treating natural phosphates with potassium-magnesium carbonate in the presence of silicates. If the crude phosphate contains natural silicates, these need not be added. If such addition is necessary it may be in the form of silicate rocks containing potash, such as finely ground leucite, phonolite, or feldspar, so that the potash is incorporated in the resulting fertiliser. In an example, a mixture of phosphate rock containing 30 per cent.  $\text{P}_2\text{O}_5$ , 2 parts, phonolite 1 part, and moist potassium-magnesium carbonate 5 parts, is sintered, yielding a highly concentrated fertiliser containing potassium and phosphate without injurious ballast substances such as chlorine and sulphuric acid. The process also has the advantage that by the use of potassium-magnesium carbonate sintering takes place at a relatively

lower temperature, viz., 1920° F., while the fusion point is much higher, viz., 2,640° F. In the known process of treating phosphate, phonolite, and soda, the sintering point is higher, viz., 2,280° F., and the fusion point is lower and closer to it, viz., 2,370° to 2,460° F., so that it is practically impossible to maintain the sintering temperature without overheating and fusion.

227,232. ESTERS, MANUFACTURE OF. F. Hefti, Altstetten, Zurich, Switzerland, and W. Schilt, Olgastrasse, 8, Zurich, Switzerland. Application date, October 31, 1923.

Citric acid or a salt is acted upon by means of benzyl alcohol or a benzyl halide at a raised temperature, e.g., about 100° C. This reaction proceeds very slowly, but a theoretical yield may be obtained if about 1 per cent. of an organic base such as pyridine or quinoline is added as a catalyst. Examples are given of the reaction between sodium or potassium citrate and benzyl chloride; and also citric acid and benzyl alcohol. The final product is tribenzyl citrate.

227,270. REFRACTORY MATERIALS. The Morgan Crucible Co., Ltd., and P. Lindsay, Battersea Works, Church Road, London, S.W.11. Application date, December 17, 1923.

Crucibles are usually made from a mixture of graphite and clay with or without sand and/or silicon carbide, but this mixture is liable under some conditions to be attacked by fuel slag, and furnace gases. It is found that this disadvantage may be avoided if the mixture contains about 30-50 per cent. of a compound of alumina and silica having the composition  $Al_2O_3SiO_2$ . This compound may be artificially prepared, or it may be a natural mineral such as sillimanite. Crucibles made of this mixture are very resistant to chemical attack, and have a low co-efficient of thermal expansion.

227,309. SEPARATING A GAS FROM A MIXTURE OF GASES, PROCESS AND APPARATUS FOR. H. Wade, London. From the Silica Gel Corporation, 1,100 Garrett Building, 239, Redwood Street, Baltimore, Md., U.S.A. Application date, March 11, 1924.

This process comprises a continuous adsorption in which the adsorbing material is used over again in a closed cycle. The material employed is silica gel having pores of such a size that it will adsorb 21 per cent. of its weight of water vapour at 30° C. and a partial pressure of 22 mm. of mercury. The

takes place in the chamber 11. Cooling water may be passed through the pipe coil 22. The gas and silica gel are delivered into the cyclone or continuous separator 26, and the separated gas passes out through the outlet 27. The gel passes down through the pipe 29 to a hopper 56, to which the passage of gas is prevented by a novel feeder 29<sup>a</sup>. This comprises a plate 85 supported by a shaft 86 and counter-balanced by a weight 88. The plate is oscillated in a horizontal plane by a rotating disc 92 and link 90 to allow solid material to discharge from the pipe 29, but not sufficiently to open up the end of the pipe to allow the passage of gas. The silica gel then passes into an activator comprising a rotatable cylinder 33, having tubes 34 connecting opposite heads 35. Hot gases are passed through the tubes from left to right. The adsorbing material and liberated gas with some air and steam are drawn through by a blower 43 and delivered to a continuous separator 45, where the adsorbing material is removed and returned to the vessel 16 for use again. A feed valve device 29<sup>b</sup>, similar to that employed for the pipe 29, is provided. The gases pass through a bag separator 47, and thence to a condenser 48 to recover any volatile constituents. The condensate may require distillation to remove condensed water. Some of the gas may be returned through the pipe 50 to the activator 33. This apparatus constitutes a single separating unit; a description is given of a complete plant embodying several such units.

NOTE.—Abstracts of the following specifications, which are now accepted, appeared in THE CHEMICAL AGE when they became open to inspection under the International Convention:—206,150 (Soc. Anon. des Matières Colorantes et Produits Chimiques de Saint Denis, A. R. Wahl and R. Lantz) relating to derivatives of naphoquinone, see Vol. X, p. 18; 208,143 (Haco-Ges. Akt.-Ges. Bern) relating to alumen compounds containing arsenic, see Vol. X, p. 175; 210,432 (F. Verola, C. Baron, A. Verley, and E. Urbain) relating to dehydration of alcohol, see Vol. X, p. 363; 214,581 (Ricard, Allenet et Cie) relating to manufacture of absolute alcohol, see Vol. X, p. 654; 215,021 (Farbwerke vorm. Meister, Lucius, and Brüning) relating to manufacture of halogenated oxythionaphthenes, see Vol. XI, p. 17; 215,379 (Durand and Huguénin Akt.-Ges.) relating to diazo dyestuffs, see Vol. XI, p. 46; 218,316 (Akt.-Ges. für Anilin Fabrikation) relating to manufacture of tanning materials, see Vol. XI, p. 245.

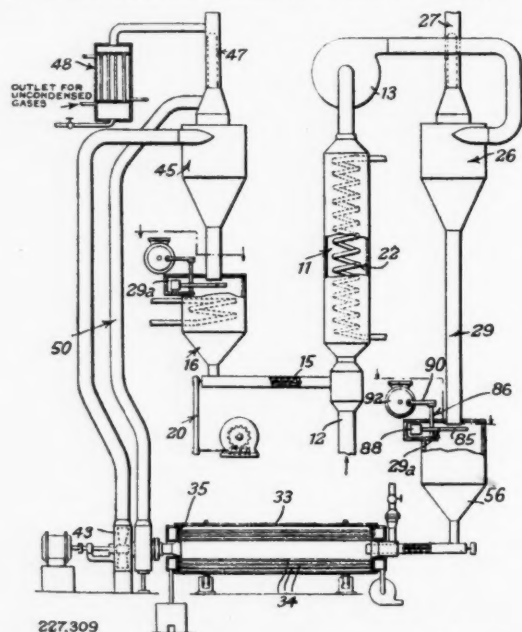
#### International Specifications not yet Accepted

225,885. REDUCTION OF ORGANIC COMPOUNDS. Naamlooze Vennootschap Handelsonderneming Feynald Maatschappij Tot Exploitatie Van Octrooien, 386, Heerengracht, Amsterdam. (Assignees of G. I. Stadnikoff, 10, Woronzow-Pole, Moscow.) International Convention date, December 7, 1923.

Oxygenated organic compounds are reduced by passing their vapour over carbon which has been impregnated with iron, nickel, or chromium, and is heated to 390° C up to a red heat. Steam or hydrogen is preferably present also. The hydroxy and acid compounds present in tars obtained from coal, lignite, or peat, may thus be reduced. Several methods of preparing the metallised carbon are described. In one case, powdered coal, coke, or charcoal is mixed with metal oxide and reduced, or with organic metal salts and then carbonised. In another case, coal, peat, wood or sugar may be impregnated with a metal salt, the oxide or hydroxide then precipitated, and the product carbonised, or the carbon may be impregnated with colloidal solutions of metal oxides or hydroxides and carbonised. Alternatively carbon may be deposited on metal powder by the decomposition of organic substances. In another alternative, asbestos, pumice, zeolite, or other silicate is mixed with a metal, metal oxide, metal salt, or colloidal solution, and carbonised where necessary by passing a gaseous organic substance over it. In an example *p*-cresol is distilled with hydrogen and passed over powdered iron on which carbon has been precipitated, heated to 430° C., toluene being obtained.

226,142. UTILISING ABSOLUTE ALCOHOL. J. H. Brégeat, 24, Rue de la Fidélité, Paris. (Assignee of G. Weissenberger, 6, Schwarzenbergplatz, Vienna.) International Convention date, December 15, 1923.

Absolute alcohol may be employed as the solvent or gelatinising agent for materials having a basis of cellulose nitrate or acetate. A cellulose ether or ester may be freed from water



process is applicable to the separation of moisture from air or other gas, and the separation of volatile liquids such as sulphur dioxide, ether, alcohol, acetone, benzol, gasoline, etc., from air.

The gas to be treated is supplied continuously at 12 to a chamber 11, through which it is drawn by a suction fan 13. Pulverised silica gel is fed from a hopper 16 by a continuously driven worm 15 into the stream of gas, and the adsorption



by means of absolute alcohol, or an ester such as nitrocellulose may be washed with absolute alcohol to remove the lower esters. The product is more homogeneous, and is free from water, and may be used for making artificial silk, films, etc. In the etherification and esterification of alcohol, by-products such as ethyl sulphate and monoesters are dissolved by adding absolute alcohol. Absolute alcohol may also be used for extracting and purifying edible fats, and for extracting perfumes from plants without also removing albumenoids, etc.

226,143. **LIQUID FUEL.** G. Henneberg and M. H. Charpentier, 24, Rue Chauchat, Paris. International Convention date, December 10, 1923. Addition to 213,526.

This liquid fuel consists of dehydrated alcohol 93-100 per cent., water up to 3 per cent., acetone 0-7 per cent., and ether 0-7 per cent. Gases such as acetylene, butylene, methane, ethylene, ethane, propane, butane, propylene, amylene, cyanogen, or ammonia, may also be dissolved in the fuel. In the case of acetylene, calcium carbide may be employed for dehydrating the alcohol.

226,180. **SEPARATING HAFNIUM AND ZIRCONIUM.** Naamlooze Vennootschap Philips' Gloeilampenfabrieken, 6, Emmasingel, Eindhoven, Holland. International Convention date, December 12, 1923.

The mixed phosphates of hafnium and zirconium are treated with hydrofluoric acid, yielding complex acids, the anion containing phosphorus, and fluorine, and hafnium or zirconium. Salts of these acids can be obtained by replacing the cation by a metal, by neutralising with a base. The hafnium and zirconium compounds can be separated by fractional crystallisation, of which a number of examples are given.

226,188. **PURIFYING OILS.** Schlesisches Kohlenforschungsinstitut der Kaiser-Wilhelm-Ges., 36, Auenstrasse, Breslau, Germany. International Convention date, December 11, 1923.

Commercial benzene, petroleum, and crude lignite or coal tars may be purified and made stable to light and air by heating to 150-400° C., without pressure, or at a pressure of 20-75 atmospheres. The unsaturated constituents are polymerised, and carbon disulphide and hydrocyanic acid are destroyed. The thiophenes are left. The polymerisation residues may be varied by using catalysts such as water, acids, alkalis, metals or metal compounds.

226,202. **GAS MANUFACTURE.** G. Patart, 50, Rue Spontini, Paris. International Convention date, December 11, 1923.

Coal, wood, or peat is distilled in an externally heated retort, and the residue treated in a producer with air and steam or distillation gases. The retorts and producer are of elongated rectangular form, and the producer gas is used for heating the retort. Separate outlets are provided for drawing off the distillation gas and producer gas, or the producer gas may be passed through the retort and drawn off with the distillate, or vice versa.

#### LATEST NOTIFICATIONS.

228,494. Method for the production of a stiff tar, rich in undecomposed bitumen, and of coke, rich in gases readily inflammable, from mineral coal. Seidenschur, F. January 30, 1924.

228,512. Method of utilising sulphite-cellulose lye, Schwalbe, Dr. C. G. January 30, 1924.

228,518. Manufacture of varnishes, impregnating-media, or the like. Farbenfabriken vorm. F. Bayer and Co. January 29, 1924.

228,557. Process of dyeing cellulose esters. Farbwerke vorm. Meister, Lucius and Brünig. January 29, 1924.

#### Specifications Accepted with Date of Application

205,833. Separation of oily or fatty substances and the like from liquids containing the same, Process for. Australian Lanoline Proprietary, Ltd. August 23, 1923.

210,402. Destructive distillation, Process for—and apparatus for use therewith. M. C. J. E. de Loisy and E. Grauce. January 27, 1923.

215,315. Rubber latex and similar materials, Apparatus for drying. General Rubber Co. April 30, 1923. Addition to 190,099.

215,716. Dehydration of organic liquids, Continuous process for. Ricard, Allenet et Cie. May 9, 1923.

216,833. Combustible gas, Production of—and apparatus therefor. A. Gibson. June 1, 1923.

227,874. Arsenic, Manufacture of medical preparations containing. W. J. Mellersh-Jackson. (*Ostro-Products Corporation of America*). July 18, 1923.

227,879. Distillation of carbonaceous substances. E. R. Sutcliffe. July 25, 1923.

227,880. Gasification and distillation of carbonaceous materials. H. Nielsen and B. Laing. August 17, 1923.

227,923. Dyes of the anthraquinone series. British Dyestuffs Corporation, Ltd., J. Baddiley, and W. W. Tatum. October 25, 1923.

227,924. Organic acidic substances from matter of vegetable origin, Recovery of. H. Wade. (*W. A. Fraymouth and Bhopal Produce Trust, Ltd.*) October 25, 1923.

227,925. Oxalic matter from natural products, Recovery of. H. Wade. (*W. A. Fraymouth and Bhopal Produce Trust, Ltd.*) October 25, 1923.

228,073. Collecting electrodes for use in the electrical precipitation of suspended particles from gaseous fluids. Lodge Cottrell, Ltd. (*Metallbank und Metallurgische Ges. Akt.-Ges.*) July 28, 1924.

#### Applications for Patents

Aktiebolaget Separator. Process of refining vegetable oils. 2,928. February 2. (United States, February 6, 1924.)

Badische Anilin- und Soda-Fabrik and Johnson, J. Y. Manufacture of oxygenated organic compounds. 2,921. February 2.

Boeniger, M. Manufacture of pyrazolone dyes. 3,514. February 7.

Chadburn, W. R. Centrifugal liquid-purifiers. 3,051. February 3.

Chadburn, W. R. Centrifugal liquid-purifiers. 3,291. February 5.

Cheesman, T. Paint. 3,180. February 4.

Chemische Fabrik Griesheim-Elektron. Dyeing. 2,964. February 2. (Germany, February 25, 1924.)

Comyn, B. D. Separation of liquids of different specific gravities. 3,186. February 4.

De Laval Chadburn Co., Ltd. Centrifugal liquid-purifiers. 3,051. February 3.

De Laval Chadburn Co., Ltd. Centrifugal liquid-purifiers. 3,291. February 5.

Doty, E. F. Centrifugal pumps. 3,405. February 6.

Farbwerke vorm. Meister, Lucius and Brünig. Production of azo-dyestuffs. 3,222. February 4. (Germany, February 8, 1924.)

Garland, C. S. Centrifugal separators. 3,153. February 4.

Grosvenor Scientific Products, Ltd. Refractory materials, etc. 2,943, 2,944. February 2.

Hailstone, H. J. Production of large crystals of sulphate of ammonia. 3,230. February 5.

Hinchley, J. W. Centrifugal separators. 3,153. February 4.

Kilby, J. N. Refining steel. 3,080. February 3.

Lechler, P. (firm of). Production of bituminous paints, etc. 2,899. February 2. (Germany, April 25, 1924.)

Lewis, S. J. Decolorising or deodorising oils. 3,017. February 3.

Lomax, E. L., and Lucas, O. D. Vacuum distillation of lubricating-oils, etc. 3,183. February 4.

Marks, E. C. R. (Keil and Son), and Nitrogen Corporation. Synthesis of ammonia. 3,190. February 4.

Maschinenfabrik Augsburg-Nürnberg Akt.-Ges., and Sokal, S. Apparatus for coating metal plates with light-sensitive substances. 3,024. February 3.

Richards, A. A. Dyeing-apparatus. 3,462. February 7.

Sandoz Chemical Works. Manufacture of pyrazolone dyes. 3,514. February 7.

Scottish Dyes, Ltd. Dyestuffs, etc. 2,950. February 2.

Thomas, J., and Thomson, R. F. Dyestuffs, etc. 2,950. February 2.

V. L. Oil Processes, Ltd. Vacuum distillation of lubricating-oils, etc. 3,183. February 4.

Watson, C. S. Centrifugal separators. 3,153. February 4.

White, W. A. Separation of liquids of different specific gravities. 3,186. February 4.

Zwicky, J. Apparatus for separating dust from gases. 3,202. February 4.

#### Patents Court Cases

APPLICATIONS have been made for the following patents to be endorsed "Licences of Right" under Section 24 of the Patents and Designs Acts, 1907 and 1919:—176,924 (G. Shimadzu) relating to manufacture of lead oxides; 215,222 (G. Shimadzu) relating to improvements in paint; 218,119 (G. Shimadzu) relating to a mixture of lead suboxide and metallic lead.

This endorsement enables any person to obtain licences to work these patents.

#### Patents in Japan

ALL patents and other industrial property rights registered in Japan at the time of the earthquake in September, 1923, must be re-registered by April 30, 1925, by a representative resident in Japan.

## London Chemical Market

The following notes on the London Chemical Market are specially supplied to THE CHEMICAL AGE by Messrs. R. W. Greff & Co., Ltd., and Messrs. Chas. Page & Co., Ltd., and may be accepted as representing these firms' independent and impartial opinions.

London, February 12, 1925.

THE past week has been one of fair activity without any special feature. If anything, perhaps, the export market shows a slight improvement.

### General Chemicals

ACETONE is in fair demand. The nominal price of £78 per ton can be improved upon for quantities.

ACETIC ACID maintains its easier tendency, although the nominal price is unchanged at £41 per ton for technical 80%, and £42 per ton for pure 80%.

ACID CITRIC has maintained its advance and a further improvement is not unlikely. Price to-day is 1s. 5d. per lb.

ACID FORMIC is lower in price, and is nominally £52 per ton for 85% ex wharf.

ACID LACTIC is in good demand and is firm at £43 per ton for 50% by weight.

ACID OXALIC is firm at 3½d. to 3¾d. per lb.

ACID TARTARIC is likely to advance in price. The figure to-day is 11¾d. to 1s. per lb.

ALUMINA SULPHATE is unchanged.

ARSENIC remains a weak market; within limits buyers can name their own prices.

BARIUM CHLORIDE is inclined to be easier in tone, price nominally £11 5s. to £11 10s. per ton.

COPPER SULPHATE is in fair demand and quoted at £23 per ton.

CREAM OF TARTAR is in better demand with price unchanged at about £77 per ton.

EPSOM SALTS are unchanged in value but an advance is expected.

FORMALDEHYDE.—It is hoped that the price has touched bottom, in fact it is difficult to see how it can go any lower. The figure to-day is £43 to £44 per ton ex wharf.

LEAD ACETATE is lower in price. White is quoted to-day at £45 per ton and brown at £44 to £45 per ton.

LEAD NITRATE is unchanged.

LIME ACETATE remains firm market at about £14 10s. per ton, basis 80%.

CAUSTIC POTASH is without special feature.

CARBONATE POTASH is unchanged.

PERMANGANATE OF POTASH maintains its firm tendency, and a further advance in price is not unlikely.

PRUSSIAN OF POTASH is very scarce and is quoted up to 8½d. per lb.

ACETATE OF SODA is rather weaker in the absence of demand. Price £22 5s. to £22 15s. per ton.

SODA BICHROMATE.—The British makers' price is unchanged and regulates the market.

SODA HYPOSULPHITE is in good demand.

SODA PRUSSIAN.—The market is firm at 4½d. per lb.

### Coal Tar Products

The market generally in coal tar products is fairly steady, the most prominent feature being the strong demand for benzol, and the continued upward tendency in values of this product.

90% BENZOL is well sold, and is quoted at 1s. 10d. to 1s. 10½d. per gallon on rails.

PURE BENZOL remains unchanged at about 2s. per gallon on rails.

CRESOTE OIL has a slightly quieter tone, although a certain amount of buying is still going on. The value is from 6½d. to 6¾d. per gallon on rails in the North, while the price in London is 7½d. to 7¾d. per gallon.

CRESYLIC ACID has a poor inquiry, and is quoted at 1s. 10d. per gallon on rails, in bulk, for the pale quality 97/99%, while the dark quality 95/97% is quoted at 1s. 7d. per gallon on rails.

SOLVENT NAPHTHA is quoted at 1s. 4d. to 1s. 4½d. per gallon on rails.

HEAVY NAPHTHA is worth about 1s. 1d. to 1s. 2d. per gallon on rails.

NAPHTHALENES show no improvement. The lower grades are being quoted at £4 10s. to £5 per ton, while 76/78 quality is quoted at £6 10s. per ton, with 74/76 quality at £5 10s. to £6 per ton.

PITCH is in slightly better demand for export, and prices are steady. To-day's values are:—40s. to 45s. f.o.b. London; 40s. to 42s. 6d. f.o.b. East and West Coast ports.

### Nitrogen Products Markets

*Export.*—During the last week the demand for sulphate of ammonia has continued steadily, and the quantities available for export are being absorbed at about £13 15s. per ton, f.o.b. As the stock in all countries is now very low, it is likely that the price will have to be slightly advanced for March and April deliveries.

*Home.*—The first ten days in February have not given as large a home demand as normally. This is due to the wet season, and the water-logged condition of a large part of the country. The slackness of demand for early February does not lead us to the view that the home demand will not be up to previous estimates.

*Nitrate of Soda.*—The nitrate of soda market has been quiet, and it seems likely now that a considerable stock will remain unsold in Europe, and will have to be carried over to next season. The alternative would be an early reduction of price for the remainder of the season. As the production of nitrate continues to grow apace, the holders of stock are in a very unpleasant position. It seems clear now that prices for this season commenced at too high a figure, and the consequences in the near future are uncertain.

### British Chemical Warfare Committee

A CHANGE is due to take place this week in the post of vice-president of the Chemical Warfare Committee, in which Captain C. V. Osborne, C.M.G., will be succeeded by Captain W. F. French, C.M.G. This Committee, which has representatives of all three Services, has its headquarters at the Howard Hotel, Norfolk Street, and the president is Colonel H. A. Lewis, C.B.E. The ordinary members include ten chemists and scientists, with representatives of the chemical manufacturers and the British Dyestuffs Corporation; and representatives of the Admiralty, War Office, and Air Ministry are *ex officio* members. There is a Chemical Warfare Experimental Station at Porton, under Colonel G. P. C. Blount, D.S.O., with a staff of about 30 officers of all the Services, of whom nine are Naval.

Captain Osborne, who has been connected with the Committee for 18 months, won the Beaufort Testimonial, Good-enough Medal, and Ryder Memorial Prize in passing for lieutenant, gaining "firsts" in all subjects; and he was awarded £6,000 by the Royal Commission on Inventions for being the first to devise and demonstrate practically a system of bow defence against mines, which led to the introduction of the paravane. Captain French, who now succeeds him, has been Deputy-Director of the Gunnery Division of the Naval Staff, and during the latter part of the war he was in command of the coastal motor-boat base at Osea Island.

### Industrial Property Conventions

A DEPUTATION consisting of the representatives of various trade bodies, including the Association of British Chemical Manufacturers, interviewed the Industrial Property Department of the Board of Trade on February 6 in connection with the International Industrial Property Conventions which are to be revised at the official conference to be held at The Hague in October next. The deputation drew attention to the various suggestions for the amendment of the conventions which were adopted at recent trade conferences held in London, and emphasised the importance of the inclusion on the British delegation at The Hague Conference of special delegates to represent British industry.

## Weekly Prices of British Chemical Products

The prices and comments given below respecting British chemical products are based on direct information supplied by the British manufacturers concerned. Unless otherwise qualified, the figures quoted apply to fair quantities, net and naked at retailers' works.

### General Heavy Chemicals

Acid Acetic, 40% Tech.—£21 to £23 per ton.  
 Acid Boric, Commercial.—Crystal, £45 per ton, Powder, £47 per ton.  
 Acid Hydrochloric.—3s. 9d. to 6s. per carboy d/d., according to purity, strength and locality.  
 Acid Nitric, 80° Tw.—£21 ros. to £27 per ton, makers' works, according to district and quality.  
 Acid Sulphuric.—Average National prices f.o.r. makers' works, with slight variations up and down owing to local considerations: 140° Tw., Crude Acid, 65s. per ton. 168° Tw., Arsenical, £5 10s. per ton. 168° Tw., Non-arsenical, £6 15s. per ton.  
 Ammonia Alkali.—£6 15s. per ton f.o.r. Special terms for contracts.  
 Bleaching Powder.—Spot, £10 10s. d/d.; Contract, £10 d/d. 4 ton lots.  
 Bisulphite of Lime.—£7 10s. per ton, packages extra, returnable.  
 Borax, Commercial.—Crystal, £25 per ton. Powder, £26 per ton. (Packed in 2-cwt. bags, carriage paid any station in Great Britain.)  
 Calcium Chloride (Solid).—£5 12s. 6d. to £5 17s. 6d. per ton d/d, carriage paid.  
 Copper Sulphate.—£25 to £25 10s. per ton.  
 Methylated Spirit 64° O.P.—Industrial, 2s. 7d. to 2s. 11d. per gall.  
 Mineralised, 3s. 8d. to 4s. per gall., in each case according to quantity.  
 Nickel Sulphate.—£38 per ton d/d. Normal business.  
 Nickel Ammonia Sulphate.—£38 per ton d/d. Normal business.  
 Potash Caustic.—£30 to £33 per ton.  
 Potassium Bichromate.—5½d. per lb.  
 Potassium Chlorate.—3d. to 4d. per lb.  
 Salammoniac.—£45 to £50 per ton d/d. Chloride of ammonia, £37 to £45 per ton. Carr. pd.  
 Salt Cake.—£3 15s. to £4 per ton d/d. In bulk.  
 Soda Caustic, Solid.—Spot lots delivered, £15 12s. 6d. to £18 per ton, according to strength; 20s. less for contracts.  
 Soda Crystals.—£5 to £5 5s. per ton ex railway depots or ports.  
 Sodium Acetate 97/98%.—£24 per ton.  
 Sodium Bicarbonate.—£10 10s. per ton, carr. paid.  
 Sodium Bichromate.—4½d. per lb.  
 Sodium Bisulphite Powder 60/62%.—£17 to £18 per ton, according to quantity, f.o.b., 1-cwt. iron drums included.  
 Sodium Chlorate.—2½d. to 3½d. per lb.  
 Sodium Nitrate refined 96%.—£13 5s. to £13 10s. per ton, ex Liverpool. Nominal.  
 Sodium Nitrite 100% basis.—£27 per ton d/d.  
 Sodium Sulphide conc. solid. 60/65.—About £15 per ton d/d. Contract £14 15s. Carr. pd.  
 Sodium Sulphide Crystals.—£9 5s. per ton d/d. Contract £9 2s. 6d. Carr. pd.  
 Sodium Sulphide, Pea Crystals.—£15 per ton f.o.r. London, 1-cwt. kegs included.

### Coal Tar Products

Acid Carbolic Crystals.—5½d. per lb. Slightly better demand.  
 Crude 60's, 1s. 7d. to 1s. 8d. per gall. Little demand.  
 Acid Cresylic 97/99.—1s. 9d. to 2s. per gall. Pale, 95%, 1s. 7d. to 1s. 10d. per gall. Dark, 1s. 7d. to 1s. 10d. per gall. Markets weaker, little demand.  
 Anthracene Paste 40%.—4d. per unit per cwt.—Nominal price. No business.  
 Anthracene Oil, Strained.—7d. to 8d. per gall. Unstrained, 6d. to 7d. per gall.  
 Benzol.—Crude 65's.—9d. to 11½d. per gall., ex works in tank wagons. Standard Motor, 1s. 4½d. to 1s. 6d. per gall., ex works in tank wagons. Pure, 1s. 9½d. to 1s. 11d. per gall., ex works in tank wagons. Supplies very scarce.  
 Toluol.—90%, 1s. 7d. to 1s. 7½d. per gall. More inquiry. Pure, 1s. 11d. to 2s. per gall. Steady demand.  
 Xylol Commercial.—2s. 3d. per gall. Pure, 3s. 3d. per gall.  
 Creosote.—Cresylic, 20/24%, 8½d. to 9d. per gall. Better demand.  
 Middle Oil, Heavy, Standard specification, 6d. to 7d. per gall., according to quality and district. Market firmer. Steady demand.  
 Naphtha.—Crude, 8d. to 9d. per gall. Solvent 90/160, 1s. 3d. to 1s. 7d. per gall. Demand good. Solvent 90/190, 11½d. to 1s. 1d. per gall. Steady business.  
 Naphthalene Crude.—Demand rather better. Cheaper in Yorkshire than in Lancashire. Drained Creosote Salts, £3 to £5 per ton. Demand rather better. Whizzed or hot pressed, £6 to £9 per ton.  
 Naphthalene.—Crystals and Flaked, £12 to £15 per ton, according to districts.  
 Pitch.—Medium soft, 40s. to 45s. per ton, according to district. Not much business.  
 Pyridine.—90/160, 18s. to 18s. 6d. per gall. Not much demand. Heavy, 11s. to 12s.

### Intermediates and Dyes

In the following list of Intermediates delivered prices include packages except where otherwise stated.

Acetic Anhydride 95%.—1s. 7d. per lb.  
 Acid H.—3s. 9d. per lb. 100% basis d/d.  
 Acid Naphthionic.—2s. 2d. per lb. 100% basis d/d.  
 Acid Neville and Winther.—5s. 8d. per lb. 100% basis d/d.  
 Acid Salicylic, technical.—1s. 0½d. to 1s. 1d. per lb. Good demand.  
 Acid Sulphanilic.—9d. per lb. 100% basis d/d.  
 Aluminium Chloride, anhydrous.—10d. per lb. d/d.  
 Aniline Oil.—8d. per lb. naked at works.  
 Aniline Salts.—8d. per lb. naked at works.  
 Antimony Pentachloride.—1s. per lb. d/d.  
 Benzidine Base.—3s. 8d. per lb. 100% basis d/d.  
 Benzyl Chloride 95%.—1s. 1d. per lb.  
 p-Chlorophenol.—4s. 3d. per lb. d/d.  
 p-Chloraniline.—3s. per lb. 100% basis.  
 o-Cresol 29/31° C.—3½d. to 4d. per lb. Poor demand.  
 m-Cresol 98/100%.—2s. 1d. to 2s. 3d. per lb. Demand moderate.  
 p-Cresol 32/34° C.—2s. 1d. to 2s. 3d. per lb. Demand moderate.  
 Dichloraniline.—2s. 3d. per lb.  
 Dichloraniline S. Acid.—2s. 3d. per lb. 100% basis.  
 p-Dichlorobenzol.—£85 per ton.  
 Diethylaniline.—4s. 3d. per lb. d/d., packages extra, returnable.  
 Dimethylaniline.—2s. 2d. per lb. d/d. Drums extra.  
 Dinitrobenzene.—9d. per lb. naked at works.  
 Dinitrochlorobenzol.—£84 10s. per ton d/d.  
 Dinitrotoluene.—48/50° C. 8d. to 9d. per lb. naked at works.  
 66/68° C. 1s. 2d. per lb. naked at works.  
 Diphenylaniline.—2s. 10d. per lb. d/d.  
 G. Salt.—2s. 2d. per lb. 100% basis d/d.  
 Monochlorobenzol.—£63 per ton.  
 a-Naphthol.—2s. 3d. per lb. d/d.  
 B-Naphthol.—1s. per lb. d/d.  
 a-Naphthylamine.—1s. 3½d. per lb. d/d.  
 B-Naphthylamine.—3s. 9d. per lb. d/d.  
 m-Nitraniline.—4s. 2d. per lb. d/d.  
 p-Nitraniline.—2s. 2d. per lb. d/d.  
 Nitrobenzene.—5½d. to 5½d. per lb. naked at works.  
 o-Nitrochlorobenzol.—2s. 3d. per lb. 100% basis d/d.  
 Nitronaphthalene.—10d. per lb. d/d.  
 p-Nitrophenol.—1s. 9d. per lb. 100% basis d/d.  
 p-Nitro-o-amido-phenol.—4s. 6d. per lb. 100% basis.  
 m-Phenylene Diamine.—4s. per lb. d/d.  
 p-Phenylene Diamine.—9s. 9d. per lb. 100% basis d/d.  
 R. Salt.—2s. 4d. per lb. 100% basis d/d.  
 Sodium Naphthionate.—2s. 2d. per lb. 100% basis d/d.  
 o-Toluidine.—10d. per lb.  
 p-Toluidine.—2s. 4d. per lb. naked at works.  
 m-Tolylene Diamine.—4s. per lb. d/d.

### Wood Distillation Products

Market quiet, American competition still fairly keen.  
 Acetate of Lime.—Brown £11 to £11 5s. per ton d/d and upward.  
 Quiet market. Grey, £15 to £15 10s. per ton. Firmer. Liquor, 9d. per gall. 32° Tw.  
 Charcoal.—£7 5s. to £9 per ton, according to grade and locality. Fair demand.  
 Iron Liquor.—1s. 7d. per gall. 32° Tw. 1s. 2d. per gall. 24° Tw.  
 Red Liquor.—10d. to 1s. per gall. 14/15° Tw.  
 Wood Creosote.—2s. 9d. per gall. Unrefined.  
 Wood Naphtha, Miscible.—4s. 9d. per gall. 60% O.P. Solvent, 5s. per gall. 40% O.P.  
 Wood Tar.—£3 5s. to £4 per ton. Demand slack and stocks being held.  
 Brown Sugar of Lead.—£44 per ton. Steady market.

### Rubber Chemicals

Antimony Sulphide.—Golden, 5½d. to 1s. 4d. per lb., according to quality. Crimson, 1s. 4d. to 1s. 6d. per lb., according to quality.  
 Arsenic Sulphide, Yellow.—1s. 11d. per lb.  
 Barytes.—£3 10s. to £6 15s. per ton, according to quality.  
 Cadmium Sulphide.—3s. 9d. to 4s. 3d. per lb., according to quantity.  
 Carbon Bisulphide.—£30 to £33 per ton, according to quantity.  
 Carbon Black.—6d. to 6½d. per lb., ex wharf.  
 Carbon Tetrachloride.—£62 10s. to £67 10s. per ton, according to quantity drums extra.  
 Chromium Oxide, Green.—1s. 3d. per lb.  
 Indiarubber Substitutes, White and Dark.—5d. to 9½d. per lb. Demand very brisk. Prices likely to remain steady owing to firmness of rapeseed oils.  
 Lamp Black.—£48 per ton, barrels free.  
 Lead Hyposulphite.—7½d. per lb.  
 Lithopone, 30%.—£22 10s. per ton.



**Mineral Rubber "Rubpron."**—£16 5s. per ton f.o.r. London.  
**Sulphur.**—£10 to £12 per ton, according to quality.  
**Sulphur Chloride.**—4d. per lb., carboys extra.  
**Sulphur Precip. B.P.**—£56 to £65 per ton.  
**Thiocarbamide.**—2s. 6d. per lb.  
**Vermilion, Pale or Deep.**—5s. 6d. per lb. Dearer.  
**Zinc Sulphide.**—7½d. to 1s. 8d. per lb., according to quality.

#### Pharmaceutical and Photographic Chemicals

**Acid, Acetic 80% B.P.**—£45 per ton ex wharf London in glass containers.  
**Acid, Acetyl Salicylic.**—2s. 11d. to 3s. 1d. per lb., according to quantity. Sales steady. Price firm.  
**Acid, Benzoic B.P.**—2s. 6d. per lb.  
**Acid, Boric B.P.**—Crystal £51 per ton, Powder £55 per ton. Carriage paid any station in Great Britain.  
**Acid, Camphoric.**—19s. to 21s. per lb.  
**Acid, Citric.**—1s. 4½d. per lb., less 5% for ton lots. Raw materials dearer, equal to ½d. per lb. on finished product.  
**Acid, Gallic.**—2s. 9d. per lb. for pure crystal, in cwt. lots. Easier.  
**Acid, Pyrogallic, Crystals.**—6s. per lb. for 1 cwt. lots. 7s. 6d. per lb. for 7-lb. lots according to quantity. Steady market.  
**Acid, Salicylic.**—1s. 6d. to 1s. 7d. per lb., according to quantity. Steady market.  
**Acid, Tannic B.P.**—2s. 9d. per lb. Quiet steady demand.  
**Acid, Tartaric.**—1s. 1d. per lb., less 5%. Very firm. Demand good.  
**Amidol.**—9s. per lb., d/d.  
**Acetanilide.**—1s. 10d. to 2s. per lb. More inquiry.  
**Amidopyrin.**—14s. 6d. per lb.  
**Ammonium Benzoate.**—3s. to 3s. 6d. per lb., according to quantity.  
**Ammonium Carbonate B.P.**—£37 per ton. Powder, £39 per ton in 5 cwt. casks.  
**Atropine Sulphate.**—12s. 6d. per oz. for English make.  
**Barbitone.**—12s. 6d. per lb. Cheaper. Market less firm for Potash and Soda Salts.  
**Benzonaphthol.**—5s. 3d. per lb. spot.  
**Bismuth Salts.**—Prices reduced by about 1s. 3d. to 2s. 3d. per lb. on account of the fall in the price of the metal.  
**Bismuth Carbonate.**—7s. 8d. to 9s. 8d. per lb. } Prices unsettled owing to difficulties in  
**Bismuth Citrate.**—8s. to 10s. per lb. } regard to supplies  
**Bismuth Salicylate.**—7s. 5d. to 9s. 5d. per lb. } of the metal.  
**Bismuth Subnitrate.**—6s. 10d. to 8s. 10d. per lb. }  
**Borax B.P.**—Crystal £29, Powder £30 per ton. Carriage paid any station in Great Britain.  
**Bromides.**—Potassium, 1s. 6d. to 1s. 8d. per lb., easier; sodium, 1s. 7d. to 1s. 9d. per lb., easier; ammonium, 1s. 11d. to 2s. 1d. per lb. Market less firm.  
**Calcium Lactate.**—1s. 7d. to 1s. 9d., according to quantity. Fair demand and steady market.  
**Chloral Hydrate.**—4s. per lb.  
**Chloroform.**—2s. 6d. per lb. for cwt. lots.  
**Creosote Carbonate.**—6s. 6d. per lb. Little demand.  
**Formaldehyde.**—£44 per ton, in barrels ex wharf London.  
**Glycerophosphates.**—Fair business passing. Calcium, soluble and citrate free, 7s. per lb.; iron, 8s. 9d. per lb.; magnesium, 9s. per lb.; potassium, 50%, 3s. 6d. per lb.; sodium, 50%, 2s. 6d. per lb.  
**Guaiacol Carbonate.**—8s. 3d. per lb.  
**Hexamine.**—2s. 11d. per lb. For bold crystal. Powder slightly less.  
**Homatropine Hydrobromide.**—25s. to 30s. per oz.  
**Hydrastine Hydrochloride.**—English make offered at 120s per oz.  
**Hydroquinone.**—4s. 3d. per lb. in cwt. lots. Foreign make.  
**Hypophosphites.**—Calcium, 3s. 6d. per lb., for 28 lb. lots; potassium, 4s. 1d. per lb.; sodium, 4s. per lb.  
**Iron Ammonium Citrate B.P.**—1s. 11d. to 2s. 3d. per lb.  
**Magnesium Carbonate.**—Light Commercial, £36 per ton net. Light pure, £46 per ton.  
**Magnesium Oxide.**—Light Commercial, £72 10s. per ton, less 2½%; price reduced; Heavy Commercial, £25 per ton, less 2½%; Heavy Pure, 2s. to 2s. 3d. per lb., according to quantity.  
**Menthol.**—A.B.R. recrystallised B.P., 50s. per lb., February delivery; Synthetic, 26s. to 35s. per lb. according to quality. English make. Increasing demand.  
**Mercurials.**—Market very quiet. Mercury slightly easier. Red oxide, 5s. 2d. to 5s. 4d. per lb.; Corrosive sublimate, 3s. 7d. to 3s. 9d. per lb.; white precipitate, 4s. 6d. to 4s. 8d. per lb.; Calomel, 3s. 10d. to 4s. per lb.  
**Methyl Salicylate.**—1s. 9d. to 1s. 11d. per lb.  
**Methyl Sulphonol.**—21s. per lb.  
**Metol.**—11s. per lb. British make.  
**Morphine and Salts.**—Reduced by 1s. to 1s. 3d. per oz.  
**Paraformaldehyde.**—2s. 8d. for B.P. quality.  
**Paraldehyde.**—1s. 4d. to 1s. 6d. per lb., in free bottles and cases.  
**Phenacetin.**—5s. 2d. per lb. in cwt. lots.  
**Phenazone.**—6s. 6d. per lb.  
**Phenolphthalein.**—4s. 8d. per lb. for cwt. lots.  
**Potassium Bitartrate 99/100% (Cream of Tartar).**—86s. per cwt., less 2½% for ton lots. Raw material again dearer.  
**Pctassium Citrate.**—1s. 10d. to 2s. 2d. per lb.  
**Potassium Ferricyanide.**—1s. 9d. per lb. Quiet.  
**Potassium Iodide.**—16s. 8d. to 17s. 5d. per lb., according to quantity. Steady market.

**Potassium Metabisulphite.**—7½d. per lb., 1-cwt. kegs included. f.o.r. London.  
**Potassium Permanganate.**—B.P. crystals, 7½d. per lb., carriage paid; commercial, 8d. to 8½d. per lb., carriage paid. Forward prices higher.  
**Quinine Sulphate.**—2s. 3d. to 2s. 4d. per oz., in 100 oz. tins. Steady market.  
**Resorcin.**—5s. per lb. In fair quantities. Supplies exceed demand.  
**Saccharin.**—63s. per lb. in 50-lb. lots.  
**Salol.**—3s. 6d. per lb., for cwt. lots. Slightly dearer.  
**Silver Proteinate.**—9s. per lb. for satisfactory product light in colour.  
**Sodium Benzoate, B.P.**—1s. 10d. to 2s. per lb. From natural benzoic acid. Supplies of good quality available.  
**Sodium Citrate, B.P.C., 1923.**—1s. 11d. to 2s. 2d. per lb., according to quantity.  
**Sodium Hypophosphite, Photographic.**—£13 to £15 per ton, according to quantity, d/d consignee's station in 1-cwt. kegs.  
**Sodium Metabisulphite Crystals.**—37s. 6d. to 60s. per cwt., net cash, according to quantity.  
**Sodium Nitroprusside.**—16s. per lb.  
**Sodium Potassium Tartrate (Rochelle Salt).**—75s. per cwt., for ton lots and upwards.  
**Sodium Salicylate.**—Powder, 2s. 2d. to 2s. 3d. per lb. Crystal, 2s. 3d. to 2s. 5d. per lb. Flake, 2s. 6d. per lb. Strong demand, market firmer.  
**Sodium Sulphide, pure recrystallised.**—10d. to 1s. 2d. per lb.  
**Sodium Sulphite, anhydrous,** £27 10s. per ton, minimum 5 ton lots, according to quantity; 1 cwt. kegs included.  
**Sulphonol.**—14s. 6d. per lb. Little demand.  
**Thymol.**—18s. per lb. Firmer.

#### Perfumery Chemicals

**Acetophenone.**—11s. per lb.  
**Aubepine.**—12s. 6d. per lb.  
**Amyl Acetate.**—3s. per lb.  
**Amyl Butyrate.**—6s. 6d. per lb.  
**Amyl Salicylate.**—3s. 3d. per lb.  
**Anethol (M.P. 21/22° C.).**—4s. 6d. per lb.  
**Benzyl Acetate from Chlorine-free Benzyl Alcohol.**—2s. 9d. per lb.  
**Benzyl Alcohol free from Chlorine.**—2s. 9d. per lb.  
**Benzaldehyde free from Chlorine.**—2s. 9d. per lb.  
**Benzyl Benzoate.**—3s. 6d. per lb.  
**Cinnamic Aldehyde Natural.**—16s. 6d. per lb.  
**Coumarin.**—17s. per lb.  
**Citronellol.**—20s. per lb.  
**Citral.**—10s. per lb.  
**Ethyl Cinnamate.**—12s. 6d. per lb.  
**Ethyl Phthalate.**—3s. per lb.  
**Eugenol.**—10s. 6d. per lb.  
**Geraniol (Palmarosa).**—31s. 6d. per lb.  
**Geraniol.**—12s. 6d. to 20s. per lb.  
**Helliotropine.**—6s. 9d. per lb.  
**Iso Eugenol.**—16s. per lb.  
**Linalol ex Bois de Rose.**—26s. per lb.  
**Linalyl Acetate.**—26s. per lb.  
**Methyl Anthranilate.**—10s. per lb.  
**Methyl Benzoate.**—5s. per lb.  
**Musk Ambrette.**—50s. per lb.  
**Musk Ketone.**—37s. 6d. per lb. Cheaper.  
**Musk Xylol.**—12s. per lb. Cheaper.  
**Nerolin.**—4s. 6d. per lb.  
**Phenyl Ethyl Acetate.**—15s. 6d. per lb.  
**Phenyl Ethyl Alcohol.**—14s. 3d. per lb.  
**Rhodinol.**—50s. per lb.  
**Safrol.**—1s. 10d. per lb.  
**Terpineol.**—2s. 5d. per lb.  
**Vanillin.**—25s. to 25s. 6d. per lb.

#### Essential Oils

**Almond Oil, Foreign S.P.A.**—13s. 9d. per lb.  
**Anise Oil.**—2s. 6d. per lb.  
**Bergamot Oil.**—16s. per lb.  
**Bourbon Geranium Oil.**—28s. per lb.  
**Camphor Oil.**—65s. per cwt.  
**Cananga Oil, Java.**—11s. per lb.  
**Cinnamon Oil, Leaf.**—6d. per oz.  
**Cassia Oil, 80/85%.**—9s. per lb.  
**Citronella Oil.**—Java, 85/90%, 5s. 9d. per lb. Ceylon, 3s. 2d. to 3s. 5d. per lb., according to quality.  
**Clove Oil.**—7s. 9d. per lb.  
**Eucalyptus Oil, 70/75%.**—2s. 1d. per lb.  
**Lavender Oil.**—French 38/40% Esters, 35s. per lb.  
**Lemon Oil.**—3s. 4d. per lb.  
**Lemongrass Oil.**—5s. 9d. per lb.  
**Orange Oil, Sweet.**—10s. 9d. per lb.  
**Otto of Rose Oil.**—Bulgarian, 42s. 6d. per oz. Anatolian, 28s. per oz.  
**Palma Rosa Oil.**—16s. 9d. per lb.  
**Peppermint Oil.**—Wayne County, 62s. 6d. per lb. Again dearer. Japanese, 20s. per lb.  
**Petitgrain Oil.**—9s. 9d. per lb.  
**Sandal Wood Oil.**—Mysore, 26s. 7d. per lb. Australian, 18s. 6d. per lb.

## Scottish Chemical Market

*The following notes on the Scottish Chemical Market are specially supplied to THE CHEMICAL AGE by Messrs. Charles Tennant and Co., Ltd., Glasgow, and may be accepted as representing the firm's independent and impartial opinions.*

Glasgow, February 12, 1925.

**BUSINESS** in the heavy chemical market still continues quiet, the amount of inquiry being moderate and for small quantity generally. One or two changes in prices are advised from the continent, notably caustic potash, which the German combine have reduced by almost £2 per ton. Calcium chloride also is slightly reduced in price. Carbonate of potash is inclined to be higher.

### Industrial Chemicals

**ACID ACETIC.**—Still in poor demand. 98/100% glacial quoted £56 to £67 per ton according to quality and packing. 80% pure, about £43 to £45 per ton. 80% technical, £42 to £44 per ton. Packed in casks delivered c.i.f. U.K. port, duty free.

**ACID BORACIC.**—Remains unchanged. Crystal or granulated £45 per ton; powdered, £47 per ton, carriage paid U.K. stations, minimum ton lots.

**ACID CARBOLIC, ICE CRYSTALS.**—Rather better inquiry and price unchanged at 5½d. per lb. delivered.

**ACID CITRIC B.P. CRYSTALS.**—Moderate inquiry and price unchanged at 1s. 4½d. per lb. less 5% ex store.

**ACID FORMIC 85%.**—Offered from the continent at about £50 per ton c.i.f. U.K. port. Spot material available at about £52 10s. per ton ex store.

**ACID HYDROCHLORIC.**—In little demand, price, 6s. 6d. per carboy ex works.

**ACID NITRIC 80%.**—£23 10s. per ton ex station, full truck loads.

**ACID OXALIC 98/100%.**—Offered from the continent at about 3½d. per lb. c.i.f. U.K. ports, duty paid. Spot lots available at about 3½d. per lb. ex store.

**ACID SULPHURIC.**—144°, £3 12s. 6d. per ton; 168°, £7 per ton, ex works, full truck loads. Dearsenicated quality, 20s. per ton more.

**ACID TARTARIC, B.P. CRYSTALS.**—In moderate demand and price unchanged at about 3½d. per lb. less 5% ex store. Offered for forward delivery at a fraction less.

**ALUMINA SULPHATE, 17/18% IRON FREE.**—Quoted £6 10s. per ton c.i.f. U.K. ports, prompt shipment. Spot lots available at about £7 5s. per ton ex store.

**ALUM.**—Lump potash alum offered from the continent at about £8 10s. per ton c.i.f. U.K. port. Spot lots available at about £9 10s. per ton, ex store. Ammonium chrome alum of British manufacture quoted £17 per ton f.o.b. U.K. port.

**AMMONIA ANHYDROUS.**—Unchanged at about 1s. 6d. per lb. ex station; containers extra and returnable, with possible slight reduction for large quantities.

**AMMONIA CARBONATE.**—Lump, £37 per ton; powdered, £39 per ton; packed in 5 cwt. casks delivered U.K. port.

**AMMONIA LIQUID 880°.**—In steady demand. Unchanged at 2½d. to 3d. per lb. delivered, according to quantity, containers extra.

**AMMONIA MURIATE.**—Grey galvanisers' crystals of English manufacture unchanged at about £30 per ton ex station, packed in casks. Bags £1 per ton less. Offered from the continent at about £25 10s. per ton c.i.f. U.K. port. Fine white crystals offered from the continent at about £21 per ton c.i.f. U.K. port.

**ARSENIC, WHITE POWDERED.**—Spot lots unchanged at about £36 per ton ex store. Offered for early delivery at slightly less.

**BARIUM CHLORIDE 98/100%.**—Spot material of English manufacture available at about £11 10s. per ton ex store. Fine white crystals offered from the continent at about £9 per ton c.i.f. U.K. port.

**BLEACHING POWDER.**—Spot lots quoted £10 10s. per ton ex station, contracts 20s. per ton less.

**BARYTES.**—English material unchanged at £5 5s. per ton ex works. Continental quoted £5 per ton c.i.f. U.K. port.

**BORAX.**—Unchanged. Granulated, £24 10s. per ton; crystals, £25 per ton; powdered, £26 per ton carriage paid, U.K. stations, minimum ton lots.

**CALCIUM CHLORIDE.**—English material unchanged at £5 12s. 6d. per ton ex station. Continental now offered at about £4 per ton c.i.f. U.K. port.

**COPPERAS, GREEN.**—Unchanged at about £3 5s. per ton ex works, packed in casks, free.

**COPPER SULPHATE.**—Continental offers inclined to be higher. Now quoted about £23 15s. per ton c.i.f. U.K. port. Spot lots available at about £24 per ton ex store. British material quoted £24 10s. per ton f.o.b. U.K. port for export.

**FORMALDEHYDE 40%.**—Nominally £46 10s. per ton ex store, but could probably be obtained for less. Offered from the continent at about £42 per ton c.i.f. U.K. port, prompt shipment.

**GLAUBER SALTS.**—White crystals of English manufacture unchanged at £4 per ton ex store or station. Fine white crystals offered from the continent at £3 5s. per ton c.i.f. U.K. port.

**LEAD, RED.**—Imported material now on offer at about £45 per ton ex store, spot delivery.

**LEAD, WHITE.**—Quoted £47 per ton ex store.

**LEAD ACETATE.**—Refined white crystals offered from the continent at about £47 per ton c.i.f. U.K. ports. Spot material available at about £49 to £50 per ton ex store. Dark brown quality quoted £40 per ton c.i.f. U.K. port.

**MAGNESITE CALCINED.**—Unchanged at about £7 17s. 6d. per ton ex station, prompt delivery. Hard burnt quality quoted £4 15s. per ton ex station. Finer quality of continental manufacture quoted £7 15s. per ton c.i.f. U.K. port.

**MAGNESIUM CHLORIDE.**—Quoted £4 2s. 6d. per ton c.i.f. U.K. port.

**POTASH CAUSTIC 88/92%.**—German manufacturers advise reduction in price of almost £2 per ton. Price now about £29 per ton ex wharf for forward delivery. Spot material quoted £31 per ton ex store.

**POTASSIUM BICHRIMATE.**—Unchanged at 5d. per lb. delivered.

**POTASSIUM CARBONATE 96/98%.**—Continental prices advanced to about £24 per ton c.i.f. U.K. port, but some cheaper lots available. Spot material quoted £25 per ton ex store. 90/92% quality quoted £21 per ton c.i.f. U.K. port.

**POTASSIUM CHLORATE.**—Quoted 2½d. per lb. c.i.f. U.K. port. Spot lots on offer at about 2½d. per lb. ex store.

**POTASSIUM NITRATE, SALTPETRE.**—Quoted £26 per ton c.i.f. U.K. port, prompt shipment from the continent. Spot lots on offer at £28 15s. per ton ex store.

**POTASSIUM PERMANGANATE, B.P. CRYSTALS.**—Unchanged at about 8½d. per lb., ex store, spot delivery.

**POTASSIUM PRUSSIAN, YELLOW.**—Unchanged at about 7½d. per lb., ex store, spot delivery. Offered for prompt shipment from the continent at about 7½d. per lb., ex wharf.

**SODA CAUSTIC.**—76/77%, £18 per ton; 70/72%, £16 2s. 6d. per ton; broken, 60%, £17 2s. 6d. per ton; powdered, 98/99%, £21 7s. 6d. per ton, all carriage paid U.K. stations, spot delivery. Contracts 20s. per ton less.

**SODIUM ACETATE.**—Spot material now on offer at about £23 10s. per ton, ex store. Offered from the continent at about £20 5s. per ton, c.i.f. U.K. port.

**SODIUM BICARBONATE.**—Refined recrystallised quality, £10 10s. per ton, ex quay or station; M.W. quality, 30s. per ton less.

**SODIUM BICHRIMATE.**—Unchanged at 4d. per lb. delivered.

**SODIUM CARBONATE.**—Soda crystals, £5 to £5 5s. per ton, ex quay or station; powdered or pea quality, £1 7s. 6d. per ton more; alkali 58%, £8 12s. 3d. per ton, ex quay or station.

**SODIUM HYPOSULPHITE.**—English material quoted £9 15s. per ton, ex station; continental about £9 5s. per ton, ex store. Offered, for forward delivery at about £8 5s. per ton, c.i.f. U.K. port. Pea crystals of English manufacture quoted £14 per ton, ex station.

**SODIUM NITRATE.**—Ordinary quality quoted £13 17s. 6d. per ton, ex store; 96/98% refined quality, 7s. 6d. per ton extra.

**SODIUM NITRITE, 100%.**—Offered from the continent at about £24 15s. per ton, c.i.f. U.K. port.

**SODIUM PRUSSIAN, YELLOW.**—Rather better inquiry. Spot material quoted 4½d. per lb., ex store.

**SODIUM SULPHATE, SALTCAKE.**—Price for home consumption, £3 10s. per ton, f.o.r. works. Good inquiry for export and higher prices obtainable.

**SODIUM SULPHIDE.**—English manufacturers quote: 60/65% solid, £15 per ton; broken, £1 per ton more; flake, £2 per ton more; crystals 31/34%, £9 5s. per ton, carriage paid U.K. stations. Minimum 4-ton lots with slight reduction for contracts over a period. Solid 60/62% offered from the continent at about £11 10s. per ton, c.i.f. U.K. port; crystals 30/32%, £8 7s. 6d. per ton, c.i.f. U.K. port.

**SULPHUR.**—Flowers, £9 10s. per ton; roll, £8 10s. per ton; rock, £8 7s. 6d. per ton; ground, £8 5s. per ton; ex store, prices nominal.

**ZINC CHLORIDE, 96/98%.**—Continental manufacture quoted £23 per ton, c.i.f. U.K. port. English material for export on offer at about £25 to £26 per ton, f.o.b. U.K. port.

**ZINC SULPHATE.**—Spot material quoted £12 10s. per ton, ex store, in little demand.

**NOTE.**—The above prices are for bulk business and are not to be taken as applicable to small parcels.

### Coal Tar Intermediates and Wood Distillation Products

**BETA NAPHTHOL.**—Good home inquiries. Price firm at 1s. per lb., delivered.

**BETA NAPHTHOL R.**—Moderate home demand. Price 1s. 2d. per lb., delivered.

CROCEINE ACID.—Some export inquiry. Price 2s. 6d. lb., f.o.b.  
 DIMETHYL ANILINE.—Small home inquiry. Price 4s. 3d. per lb., delivered.  
 MONO METHYLAMINE.—Some export inquiries. Price 17s. per lb., 100% basis, f.o.b.  
 METHYL CRESIDINE.—Small export inquiry. Price 14s. 6d. per lb., 100% basis, f.o.b.  
 ORTHO TOLUIDINE.—Good export inquiries. Price 6½d. per lb., f.o.b., drums included.  
 PARANITRANILINE.—Good export inquiries. Price 2s. 1½d. per lb., f.o.b.

## The Manchester Chemical Market

[FROM OUR OWN CORRESPONDENT.]

Manchester, February 12, 1925.

THE decision this week of the American section of the Lancashire cotton textile industry, a very large user of heavy chemicals in this area, to resort to increased short-time working is a disturbing element in the market here. How far it will react on buying operations remains to be seen. In the meantime business is proceeding on quietly steady lines, without any large amount of activity in any particular section. Overseas demand continues at about the same level of the past few weeks. Values are steady on the whole, but here and there a slightly easier tendency is to be observed.

### Heavy Chemicals

Prussiate of soda has lost some of its firmness and current values are 4d. to 4½d. per lb.; the demand for this material is quiet. Saltcake is in moderate request at about £4 per ton. Glauber salts are in small demand, but values remain to about £3 10s. per ton. Hyposulphite of soda is about unchanged from last report at £13 10s. to £13 15s. per ton for photographic crystals and £9 10s. for commercial. The movement of sulphide of soda is still restricted; 60-65 per cent. concentrated solid remains at about £13 15s. per ton, with crystals on offer at £9 10s. Soda crystals meet with a moderate inquiry at round £5 5s. per ton. Caustic soda continues steady and meets with a fairly active demand; values range from £15 12s. 6d. per ton for 60 per cent. material to £18 for 76-77 per cent. Alkali is also maintained at £6 15s. per ton, a moderate amount of business being done. The demand for bleaching powder is comparatively quiet, but the price is still about £9 10s. per ton. Bichromate of soda is in fair inquiry at about 4d. per lb. Phosphate of soda is in rather small request and is a shade cheaper at £13 per ton. Bicarbonate of soda continues steady at round £10 10s. per ton. Chlorate of soda meets with a quiet demand at 2½d. per lb. Acetate of soda prices have a weak tendency and are now about £20 10s. per ton; business is only on a restricted scale.

Caustic potash is not attracting a great deal of attention; current quotations are from £30 to £31 per ton. Carbonate of potash is steady and in fair inquiry at £23 10s. to £24 per ton. Chlorate of potash is quiet but about unchanged from last week's level of 2½d. per lb. Prussiate of potash is a shade easier, to-day's value being about 7½d. per lb. Permanganate of potash is in limited demand at 7½d. to 8d. per lb. according to quality. Bichromate of potash is rather quiet but steady at 5d. per lb.

Arsenic shows little sign as yet of recovery and prices are weak, although perhaps little changed from last week, white powdered, Cornish makes, offering at about £35 per ton in Manchester. Sulphate of copper is steady and in fair demand at £24 15s. to £25 per ton. Commercial Epsom salts are in limited request at £4 5s. to £4 10s. per ton; magnesium sulphate, B.P. quality, is on offer at about £6 5s. Acetate of lime is in quietly steady demand and prices are maintained at round £15 10s. per ton for grey quality, brown still being quoted at £10 10s. to £11. Nitrate of lead is steady though in small inquiry at £41 10s. to £42 per ton. Acetate of lead has lost some of its recent strength; white is now quoted at £47 and brown at £43 per ton.

### Acids and Tar Products

Acetic acid is not attracting very much attention at the moment; 80 per cent. is quoted at £41 to £41 10s. per ton,

and glacial at £67 to £68. Prices for tartaric and citric acids are hardening; round 1s. 1d. per lb. is now asked for tartaric and up to 1s. 4½d. for citric. Oxalic acid continues very quiet at 3½d. per lb.

There is not much movement in coal tar products taken as a whole. Pitch is quiet at about 42s. 6d. per ton. Carboic acid is a weak section at 5½d. per lb. for crystal and round 1s. 9d. per gallon for crude material. Creosote oil is steady at 7d. to 7½d. per gallon, while cresylic acid is maintained at round 2s. Naphthalene is steady and in fair demand at £15 10s. to £16 per ton for refined and from £5 5s. for crude. Solvent naphtha is quoted here at about 1s. 5½d. per gallon.

## Magadi Soda Co., Ltd.

### Judge Refuses to Appoint British Trust Association as Trustees

MR. JUSTICE EVE in the Chancery Division on Thursday gave judgment on the petition for the sanction of the court to the scheme of arrangement between the Magadi Soda Co., Ltd., and the various classes of share and debenture holders.

His lordship said that the British Trust Association were appointed trustees for the debenture holders. The company became unable to carry on its business, and Mr. Andrew Wilson Tate was appointed receiver and manager. He was at that time chairman of the British Trust Association. The company's operations at Magadi were being carried on under leases granted by the Crown Agent for the Colonies, which provided for the right of entry if a receiver were appointed. A debenture holder's action, in which the receiver was appointed, had been started only with the view of bringing about a reconstruction of the company and a rehabilitation of its finances.

A compulsory winding up order, strenuously supported by Mr. Pennell, a debenture holder, and as strenuously opposed by the receiver and large debenture holders associated with the British Trust Association, was made. It was said that the Colonial Office, although desiring a reconstruction of the company, would withdraw concessions and re-enter under the leases if a compulsory order were made. He did not believe that the Colonial Office ever said or did anything to justify that statement. But even had it been otherwise he need hardly say that he would not have been influenced in the least thereby, if once he were satisfied that the case was one calling for the protection of a compulsory order. The affairs of the company passed into the hands of the official receiver, and this scheme came before the court and was sanctioned with one modification, which related to the appointment of the British Trust Association as trustees for the debenture holders. Instead of this, the trustees were to be appointed by the judge. This substitution was made in consequence of evidence given by Mr. Pennell, which, in substance, amounted to an allegation that the British Trust Association, the directors and their partners and the receiver, Mr. A. W. Tate, while refusing to give information to the debenture holders were, in fact, acquiring debentures from their *cestuis que* trust at inadequate prices, and this not in their own names, but in the names of companies controlled by them. His lordship regretted to say there was a substantial stratum of truth underlying Mr. Pennell's allegations. The most serious part was incontrovertible and the question was, ought he to treat this association, controlled as it was obviously by the late receiver and those associated with him in the matters complained of, as disqualified from being any longer trustees for the debenture holders? By methods which, but for the pertinacious industry of one man would have concealed the irrespective interests in the transaction, the British Trust Association and the associated companies bought and sold £30,750 of debentures. The receiver not only filled a fiduciary position, but his appointment to such a responsible position presupposed that he would discharge his duties with punctilious rectitude. He was by his office absolutely disqualified from purchasing the interest of any one to whom he stood in a fiduciary position. His lordship declined to appoint the British Trust Association as trustees, and the appointment would be referred to the judge in chambers.

The debenture holders and all others interested in the company were indebted to Mr. Pennell for exposing the irregularities referred to, and the costs of these proceedings must be paid by the British Trust Association.



### Chemical Trade Inquiries

The following inquiries, abstracted from the "Board of Trade Journal," have been received at the Department of Overseas Trade (Development and Intelligence), 35, Old Queen Street, London, S.W.1. British firms may obtain the names and addresses of the inquirers by applying to the Department (quoting the reference number and country), except where otherwise stated.

**CHINA CLAY, CRUDE RUBBER.**—A commission agent in Stockholm desires to represent British exporters of China Clay for paper mills and crude rubber. (Repetition of Reference No. 658.) (Reference No. 158.)

**LEADS, ACIDS, OILS, ETC.**—A firm of general agents for artificial manures and chemicals in Prague, desires to secure the sole agency, mainly on a commission basis, of British manufacturers of the above goods. (Reference No. 147.)

**LIME.**—1,800 tons of rich burnt lime for Leeds Sewerage Committee. Chairman of the Committee, Town Clerk's office, by February 18.

**PAINTS.**—A firm of commission agents in Madrid desires to represent a British firm manufacturing paints. (Reference No. 185.)

### New Chemical Trade Marks

#### Applications for Registration

This list has been specially compiled for us by Mr. H. T. P. Gee, Patent and Trade Mark Agent, Staple House, 51 and 52 Chancery Lane, London, W.C.2, from whom further information may be obtained, and to whom we have arranged to refer any inquiries relating to Patents, Trade Marks and Designs.

Opposition to the Registration of the following Trade Marks can be lodged up to March 11, 1925.

#### "AVENWITE."

451,990. For chemical substances used in manufactures, photography, or philosophical research, and anti-corrosives. Class I. John Hall and Sons (Bristol and London), Ltd., 51, Broadmead, Bristol, paint and varnish manufacturers. September 18, 1924.

#### "KOMO."

453,891. For chemical substances used in manufactures, photography, or philosophical research, and anti-corrosives. Class I. Paton, Calvert and Co., Ltd., Binns Road, Old Swan, Liverpool, manufacturers. November 22, 1924. (To be Associated. Sect. 24.)

#### "MOZANIUM."

454,339. For varnish. Class I. Alfred Ernest Furze, 15, Cross Terrace, Rothwell, near Leeds, Yorkshire, manufacturer. December 8, 1924.

#### "CRUSTEX."

454,358. For a preparation for the prevention and for the removal of scale and incrustation in steam boilers, hot-water heating systems and water-circulating pipes. Harry Heathcote, 42, Earlham Grove, Forest Gate, London, E.7; manufacturer. December 8, 1924.

#### "GRANSORBIA."

454,478. For chemical substances used in manufactures, photography, or philosophical research, and anti-corrosives. Class I. R. R. Minton and Co., Ltd., 39, Cheapside, Liverpool; paint, colour and varnish manufacturers. December 12, 1924.

### Dyestuffs Licences for January

THE following statement relating to applications for licences under the Dyestuffs (Import Regulation) Act, 1920, made during January has been furnished to the Board of Trade by the Dyestuffs Advisory Licensing Committee:—

The total number of applications received during the month was 430, of which 336 were from merchants or importers. To these should be added 13 cases outstanding on January 1, making a total for the month of 443. These were dealt with as follows:—Granted, 323 (of which 299 were dealt with within 7 days of receipt); referred to British makers of similar products, 91 (of which 79 were dealt with within 7 days of receipt); referred to Reparation Supplies available, 16 (all dealt with within two days of receipt); outstanding on January 31, 1925, 13. Of the total of 443 applications received, 394 or 89 per cent. were dealt with within 7 days of receipt.

### Company News

**YORKSHIRE INDIGO, SCARLET AND COLOUR DYERS, LTD.**—For the past year a net profit of £13,666 was secured, and £3,203 was brought in. A dividend on the ordinary shares of 7½ per cent., less tax, is proposed, leaving a balance of £3,561 to be carried forward.

**LOW TEMPERATURE CARBONISATION, LTD.**—Important developments are expected shortly. It is stated that a new company will be formed with a capital of about £500,000. It will embrace the Tully Gas plants and other undertakings recently absorbed by the existing company. It is possible that the future operations for the company will also embrace the working of an important Yorkshire coal company.

### Chemical Merchant's Failure

THE public examination of George Herbert Wattson, of 133, Fenchurch Street, London, E.C., was held on February 4 at the London Bankruptcy Court. He had carried on business as a chemical merchant and his liabilities were £842, of which £814 was expected to rank, and his assets £27.

For many years before 1909 he was employed as manager at a salary of £200 a year by the late Paul Jantzen, who carried on business from 133, Fenchurch Street, E.C. Mr. Jantzen died in 1909 and Wattson then entered into partnership with Mr. Jantzen's son and they traded together as Jantzen and Co. from the same address. In October, 1922, in consequence of bad trade, the partnership was dissolved and the debtor continued to carry on the business under the style of Wattson and Co. from the same address. He paid his outgoing partner £254 in respect of his interest in the firm, but the effect of the payment was to make him insolvent to the amount of £39, according to his books of account, but taking into consideration a private debt of £225 his actual deficiency then amounted to £264. The results of his subsequent trading were not satisfactory and eventually a bankruptcy petition was presented against him and a receiving order obtained.

### The Faraday Society

AN ordinary meeting of this Society will be held on Monday, February 16, at 8 p.m., in the rooms of the Chemical Society, Burlington House, London, W.1, when the following papers will be read:—"The Effect of Superposed Alternating Current on the Anodic Solution of Gold in Hydrochloric Acid" (A. J. Allmand and V. S. Puri); "The Electrolytic Deposition of Cadmium and other Metals on Aluminium" (C. H. Desch and Eileen Vellan); "The Electrolytic Corrosion on Ferrous Metals" (W. M. Thornton and J. A. Harle); "Over voltage and Surface Forces at the Lead Cathode" (S. Glasstone); "The Electrolysis of Nitrobenzene with the Mercury-dropping Cathode" (M. Shikata); "The Law of Distribution of Particles in Colloidal Suspensions: A Note on the Specific Volume of a Gamboe Suspension" (J. R. Coutts); "On the Distribution of Particles in Colloidal Suspensions" (W. W. Barkas).

### Chemical Merchant Gains Discharge

PIERRE MARCOTTY, merchant and agent, of 129, Cannon Street, London, E.C., who was adjudged a bankrupt in January, 1922, applied in the London Bankruptcy Court on February 6 for his order of discharge.

The debtor began business as a merchant and agent specialising in chemicals in January, 1916. He traded at 129, Cannon Street, but the business was never a success, and in November, 1920, with a view to raising further capital, he transferred his assets to a company styled P. Marcotty and Co., Ltd., and as sale consideration he was allotted 1,495 shares as fully paid, and he was appointed the managing director of the company at a remuneration of £750 per annum. In 1919 he entered into a contract together with the Anglo-European Trading Co. to buy from one Aupach of Holland 10 tons of oxalic acid for £950 and at the same time he contracted with Spaulding and Co. of Manchester to sell it at 11d. a lb., which represented a profit to himself of 1½d. a lb. Only five tons were delivered, and in consequence he was sued by Spaulding and Co. for breach of contract. In July, 1921, judgment was obtained against him for damages, £900 and costs. An immediate discharge was granted, subject to judgment for £20 being paid by the debtor.

## Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for any errors that may occur.

### County Court Judgments

[NOTE.—The publication of extracts from the "Registry of County Court Judgments" does not imply inability to pay on the part of the persons named. Many of the judgments may have been settled between the parties or paid. Registered judgments are not necessarily for debts. They may be for damages or otherwise, and the result of bona-fide contested actions. But the Registry makes no distinction of the cases. Judgments are not returned to the Registry if satisfied in the Court books within twenty-one days. When a debtor has made arrangements with his creditors we do not report subsequent County Court judgments against him.]

KNOX, WALKER AND CO., LTD., 422, Kingsland Road, manufacturing chemists. (C.C., 14/2/25.) £22 14s. 10d. December 10.

MERRYWEATHER (FRED. W.) AND CO., LTD., 29-33, Pritchard Street, Chorlton-on-Medlock, chemical merchants. (C.C., 14/2/25.) £31 14s. 6d. December 11, and £87 1s. 6d. December 18.

### Mortgages and Charges

[NOTE.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every Company shall, in making its Annual Summary, specify the total amount of debts due from the Company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an \*—followed by the date of the Summary, but such total may have been reduced.]

HOLDERS, LONDON (1925), LTD., soap manufacturers\* (M., 14/2/25.) Registered January 30, £1,500 debentures, to J. Nolan, White Gables, Hillcroft Crescent, Ealing, director of companies; general charge.

NEWBALL AND MASON, LTD., Nottingham, chemists. (M., 14/2/25.) Registered February 2, £15,000 debentures; general charge.

SEMPROLIN CO., LTD., London, E.C., chemists. (M., 14/2/25.) Registered January 30, £1,000 debentures, to Sir C. E. Cottier, 1, Tower Royal, E.C.; general charge (subject to existing debenture). \*Nil. January 10, 1924.

TAYLOR'S DRUG CO., LTD., Leeds. (M., 14/2/25.) Registered February 2, £4,000 mortgage to Miss M. E. Creighton, J.P., and R. Creighton, J.P., Carlisle; charged on 75, English Street, and 1 and 2, Lowther Arcade, Carlisle. \*£111,744 os. 11d. September 12, 1924.

TECHNO-CHEMICAL LABORATORIES, LTD., London S.W. (M., 14/2/25.) Registered February 3, £50,000 debentures (filed under section 93 (3) of the Companies (Consolidation) Act, 1908), present issue, £38,900; general charge. \*Nil. April 28, 1924.

### Satisfaction

SEMPROLIN CO., LTD., London, E.C., chemists. (M.S., 14/2/25.) Satisfaction registered January 30, £2,500, part of amount registered September 23, 1924.

### London Gazette, &c.

#### Reduction of Capital

LOTHIAN CHEMICAL CO., LTD. (R.C., 14/2/25.) Petition presented by the company craving an Order confirming the reduction of the capital of the company from £30,000, consisting of 30,000 ordinary shares of £1 each, of which 15,000 shares have been issued and are fully paid and 15,000 are unissued, to £20,200, of which 5,200 have been issued and are fully paid and 15,000 are unissued, and that such reduction be effected by repaying 9,800 ordinary fully paid shares and by extinguishing the said shares and all liability thereon, which reduction was resolved on by special resolution adopted at meetings of the company on January 15, 1925, and February 2, 1925.

#### Company Winding Up

C.V.O. CHEMICAL WORKS (1919), LTD. (C.W.U., 14/2/25.) H. V. Watson, 29, Friar Lane, Leicester, appointed liquidator, November 26, 1924.

### Companies Winding Up Voluntarily

BRITISH BYE PRODUCTS CO., LTD. (C.W.U.V. 14/2/25.) V. Wolfgang Bell appointed liquidator, January 23.  
DR. CASSELL'S MEDICINE CO., LTD. (C.W.U.V., 14/2/25.) T. Silvey, 10, Norfolk Street, Manchester, Incorporated Accountant, appointed liquidator, February 6.  
MITCHELL DRUG CO., LTD. (C.W.U.V., 14/2/25.) H. Beswick, Chartered Accountant, 9, John Street, Adelphi, W.C.2, appointed liquidator, January 23.

### Notice of Intended Dividend

RICHARDSON, Thomas, Shorey Bank, Darwen, trading as THE EVERGLOSS CO., polish manufacturer.—Last day for receiving proofs, February 21. Trustee, E. D. Symond, 11, Dale Street, Liverpool.

### Partnership Dissolved

STUART OIL CO (Archibald Conrad MERTZ, and Wyndham Jenkins CLARKE), oil blenders, Cardiff, by mutual consent, as from January 1, 1925. Debts received and paid by A. C. Mertz, who will continue the business.

### New Companies Registered

AGS PATENTS AND ROYALTY CO., LTD., Old Trinity House, 5, Water Lane, Great Tower Street, London, E.C.3. To acquire any patents, etc., relating to glue or to any process for hardening glue in bead or pearl form. Manufacturing chemists, and dealers in chemicals of all kinds. Nominal capital, £27,000 in 25,000 ordinary shares of £1 and 40,000 deferred shares of 1s.

BERNSTEIN'S PHARMACY, LTD. Manufacturing, wholesale, retail, consulting, analytical and dispensing chemists and druggists, etc. Nominal capital, £500 in £1 shares. Solicitor: C. H. Kirby, 29, Red Lion Square, London.

ALFRED BIRD AND SONS, LTD., Devonshire Works, Deritend, Birmingham. Manufacturers of and dealers in custard, egg and baking powders; wholesale and manufacturing chemists, etc. Nominal capital, £400,000 in £1 shares.

HUMBER CHEMICALS, LTD. Chemists, druggists, dry-salters, oil and colourmen, soap manufacturers, etc. Nominal capital, £1,000 in £1 shares. Solicitor: W. Morgan, Cogan Chambers, Bowalley Lane, Hull.

JOHNSON AND JOHNSON (GT. BRITAIN), LTD., 106, Golden Lane, London, E.C. Artificial limb makers, manufacturing wholesale, retail, consulting and analytical chemists and druggists, drysalters, etc. Nominal capital, £100,000 in £1 shares.

H. MANSFIELD AND CO., LTD. Dealers in vegetable oils and fats, fish and whale oil, feeding stuffs and fertilisers, greases, etc. Nominal capital, £2,500 in 1,000 founders' shares of 5s. and 2,250 ordinary shares of £1. A director: H. Mansfield, Chancery Buildings, Manor Street, Hull.

MIDDLESEX MOAPHALTE, LTD. To acquire any interests in any inventions relating to the manufacture and preparations of amoa coldphalte and products thereof, and the emulsification of bitumen and bituminous materials, etc. Nominal capital, £3,000 in £1 shares. Solicitors: Benham, Synnott and Wade, Suffolk House, London, E.C.

J. AND E. MORTON, LTD., Pollard Street, Milnsbridge, nr. Huddersfield. Tar and ammonia distillers; manufacturing chemists, etc. Nominal capital, £20,000 in £1 shares.

VOLATILE METALS EXTRACTION CO., LTD., 46, Queen Victoria Street, London, E.C.4. Smelters and miners, etc. Nominal capital, £3,000 in 2,750 10 per cent. participating preference shares of £1 each and 5,000 ordinary shares of 1s. each.

### Tariff Changes

HUNGARY.—Chemicals are now duty free.

ROUMANIA.—The importation, manufacture, and use of, synthetic essences in the preparation of beverages is prohibited.

SPAIN.—The export duty on olive oil is withdrawn as from February 1.

